Semester	*Course 1	*Course 2	*Course 3	**Elective / Optional	Course	***Languages	****Compulsory	Total Credit	Total working hour
I	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)			3+3	2	23	4+4+4+4+4+4 +4+4+2 = 34
II	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)			3+3	2	23	4+4+4+4+4+4 +4+4+2 = 34
III	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2		3+3		23	4+4+4+4+4+4 +2+4+4=34
IV	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2		3+3	2	25	4+4+4+4+4+4 +2+4+4+2=36
V	8 [(2x3T) +2P]	8[(2x3T) +2P]	8 [(2x3T) +2P]				2	26	3+3+4+3+3+4 +3+3+4+2=32
VI	8 [(2x3T) +2P]	8 [(2x3T) +2P]	8 [(2x3T) +2P]				2	26	3+3+4+3+3+4 +3+3+4+2=32
								146	**202**

MANGALORE UNIVERSITY
Suggested programme structure for the Under Graduate Programmes
Bachelor of Science (B. Sc.)

Note:
* Course 1 / * Course 2 / * Course 3: I to IV semesters Theory: 3 credit = 4 contact hours & Practicals: 2 credit = 4 contact hours
* Course 1 / * Course 2 / * Course 3: V to VI semesters Theory: 2 credit = 3 contact hours & Practicals: 2 credit = 4 contact hours
**Elective / Optional: 2 credit = 2 contact hours
***Languages: 3 credit = 4 contact hours
****Compulsory: 2 credit = 2 contact hours

MANGALORE UNIVERSITY
B. Sc. SEP 2024
COURSE PATTERN AND SCHEME OF EXAMINATION
CORE SUBJECT: PHYSICS

Core/ Elective	Course Code	Title	Instruction hours/Week	Duration of the Exam (hours)	Max. Marks			Credits
					IA	Exam	Total	
I Semester								
Group I Core Subject	BSCPHCS 101	Mechanics & properties of matter	4	3	20	80	100	3
	BSCPHPS 101	Practicals - Mechanics & properties of matter	4	3	10	40	50	2
Total Number of Credits for Core Subject (Physics) in I Semester: 5								
II Semester								
Group I Core Subject	BSCPHCS 201	Acoustics, Relativity & Thermal Physics	4	3	20	80	100	3
	BSCPHPS 201	Practicals - Acoustics, & Thermal Physics	4	3	10	40	50	2
Total Number of Credits for Core Subject (Physics) in II Semester: 5								
III Semester								
Group I Core Subject	BSCPHCS 301	Optics & Electricity I	4	3	20	80	100	3
	BSCPHPS 301	Practicals - Optics & Electricity I	4	3	10	40	50	2
Group II Discipline Elective (optional)	BSCPHES 301	Geophysics and Bio – Medical Physics	2	2	10	40	50	2
Total Number of Credits for Core subject (Physics) in III Semester: 5 Discipline elective: 02								
IV Semester								
Group I Core Subject	BSCPHCS 401	Optics & Electricity II	4	3	20	80	100	3
	BSCPHPS 401	Optics & Electricity II	4	3	10	40	50	2
Group II Discipline Elective (optional)	BSCPHES 401	Astrophysics and Indian knowledge system	2	3	10	40	50	2
Compulsory Skill/ Practicals	BSCPHIS 401	Maintenance of Opto - electrical - electronics instruments	2	Viva-voce	10	40	50	2
Total Number of Credits for Core subject (Physics) in III Semester: 5 Discipline elect. Opt.: 2 Compulsory skill / practical: 2								
V Semester								
Group I Core Subject	BSCPHCS 501	Quantum Mechanics & Spectroscopy	4	3	20	80	100	3
	BSCPHCS 502	Condensed matter Physics	4	3	20	80	100	3
	BSCPHPS 501	Practicals – Modern Physics	4	3	20	80	100	2
Total Number of Credits for Core Subject (Physics) in V Semester: 8								
VI Semester								
Group I Core Subject	BSCPHCS 601	Nuclear Physics	4	3	20	80	100	3
	BSCPHPS 602	Electronics	4	3	20	80	100	3
	BSCPHPS 601	Practicals – Nuclear Physics & Electronics	4	3	20	80	100	2
Total Number of Credits for Core Subject in VI Semester: 8								
Total number of Credits for Core Subject (Physics) from I - VI Semesters: 36 Discipline elective: 4, Compulsory skill / practical: 2								

Note: The theory IA will be based on the average of two internal tests. The Practical IA will be based on regular performance and one model test.

Mangalore University
SEP 2024 B Sc Physics syllabus structure

B Sc I Semester	B Sc II Semester
➢ Paper Title: Mechanics & properties of matter ➢ Paper Code: BSCPHCS101 ➢ Unit distributions: Unit 1: Newtonian mechanics, review of vectors, gravitation law Unit 2: Rotation dynamics, rigid body Unit 3: Properties of matter, elasticity Unit 4: Fluid mechanics ➢ Practical title: Mechanics & properties of matter Practical Code: BSCPHPS101	➢ Paper Title: Acoustics, Relativity & Thermal Physics Paper Code: BSCPHCS201 ➢ Unit distributions: Unit 1: Acoustics, Fourier theorem Unit 2: Relativity Unit 3: Thermaodynamics Unit 4: Thermal radiation ➢ Practical title: Acoustics & Thermal Physics ➢ Practical Code: BSCPHPS201
B Sc III Semester	**B Sc IV Semester**
➢ Paper Title: Optics & Electricity I ➢ Paper Code: BSCPHCS301 ➢ Unit distributions: Unit 1: Review of theories of light, Interference Unit 2: Diffraction Unit 3: Network elements & theorems Unit 4: Transients, electrical measurements & dielectrics ➢ Practical title: Optics & Electricity I ➢ Practical code: BSCPHPS301	➢ Paper Title: Optics & Electricity II ➢ Paper Code: BSCPHCS401 ➢ Unit distributions: Unit 1: Electromagnetic theory Unit 2: Polarization Unit 3: Alternating current and filters Unit 4: Thermo electricity & power transmission ➢ Practical title: Optics & Electricity II ➢ Practical Code: BSCPHPS401
B Sc V Semester (2 papers)	**B Sc VI Semester** (2 papers)
➢ **Paper 1 title**: Spectroscopy & Quantum mechanics ➢ Paper code: BSCPHCS501 ➢ Unit distributions: Unit 1: Development of Quantum mechanics Unit 2: Quantum Mechanics Unit 3: Atomic Models & Spectra Unit 4: Molecular Spectra, Scattering ➢ **Paper 2 title**: Condensed matter Physics ➢ Paper code: BSCPHCS502 ➢ Unit distributions: Unit 1: Statistical Physics, specific heat of solids & nano materials Unit 2: X - ray Crystallography & Super conductivity Unit 3: Band theory of solids Unit 4: Semiconductor Physics ➢ Practical title: Modern Physics ➢ Practical Code: BSCPHPS501	➢ **Paper 1 title**: Nuclear Physics ➢ Paper code: BSCPHCS601 ➢ Unit distributions: Unit 1: Nuclear properties, radioactivity Unit 2: Nuclear decay & spectra of nuclear radiation Unit 3: Nuclear force, nuclear reaction and nuclear reactors Unit 4: Particle accelerators & detectors & fundamental particles ➢ **Paper 2 title**: Electronics ➢ Paper code: BSCPHCS602 ➢ Unit distributions: Unit 1: BJT and FET amplifiers Unit 2: OPAMP & Oscillators Unit 3: Regulated Power Supply & Communication Electronics Unit 4: Digital Electronics ➢ Practical title: Nuclear Physics & Electronics ➢ Practical Code: BSCPHPS601

<table>
<tr>
<td>B Sc III Semester Discipline Elective optional

➢ Paper Title: Geophysics and Bio – medical Physics
➢ Paper Code: BSCPHES301
➢ Unit distribution
Unit I : Geophysics
Unit II : Biophysics
Unit III: Medical Physics</td>
<td>B Sc IV Semester Discipline Elective optional

➢ Paper Title: Astrophysics & Space mission Indian knowledge system
➢ Paper Code: BSCPHES401
➢ Unit distributions:
Unit I : Stellar coordinates and parameters
Unit II : Evolution of stars and Universe
Unit III: Indian knowledge system</td>
</tr>
<tr>
<td colspan="2">B Sc IV Semester compulsory skill / practicals

➢ Paper Title: Maintenance of Opto - electrical - Electronics instruments
➢ Paper Code: BSCPHIS401
➢ Objective: Departmental internship to enhance students’ skills.</td>
</tr>
</table>

MANGALORE UNIVERSITY

SYLLABUS FOR B Sc PHYSICS SEP 2024

Semester – I

Mechanics & properties of matter

Programme Name	B Sc in Physics	Semester	I
Course Title	Mechanics & properties of matter		
Course Code	BSCPHCS101	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to

respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems

in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, give and receive clear instructions.

Course Learning Outcomes (CO)		**Program outcomes (POs)**					
At the end of the course students will be able to:		**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
i.	Estimate the possible error in measurement of a physical quantity, using its dimensional equation, the least counts of instruments used and by actual measurements in the appropriate system of units.	**X**	**X**	**X**		**X**	**X**
ii.	Apply laws of conservation of momentum and associated energy along with laws to motion to the systems of linear/rotational motion to determine different parameters associated with physically rigid bodies.	**X**	**X**	**X**			
iii.	Capable of determining various elastic moduli of materials.	**X**	**X**	**X**		**X**	
iv.	Apply the concept of rotational dynamics and simple harmonic motion in various applications.	**X**	**X**		**X**		
v	Explain bending of beams and use of torsion pendulum in the determination of various physical parameters.	**X**	**X**				**X**
vi	Measure surface tension and factors affecting surface tension of liquids and hence measurement of viscosity liquids.	**X**	**X**		**X**		**X**

I Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Paper: Mechanics & properties of matter		Duration
UNIT - I	**Mechanics:** Units and dimensions, Review of scalars and vectors. Derivative of a planar vector of constant magnitude but changing direction. Deduction of the results of uniform circular motion. Problems. (4) Review of Newtonian mechanics: Newton's laws of motion, Concepts of inertia, force, momentum and energy. (2 h) Conservation laws – linear and angular momentum and energy with examples, circular motion – central forces, centripetal and centrifugal forces with examples. Planetary motion- orbital motion, Kepler's laws (derivation). - Projectile motion with examples - escape velocity. Satellite motion, rockets, single and multistage rockets- rocket fuel, rocket shape, time period of the satellite, different types of satellites, shapes of the orbits of satellites motion. Launching of satellites, re-entry problems. Problems. (7 h)	13 h
UNIT - II	**Rigid body mechanics:** Moment of inertia and radius of gyration. Theorems of moment of inertia – parallel and perpendicular axes theorems with proof. Calculation of MI of regular and irregular shaped bodies - rectangular lamina, thin rod, circular disc (about different axes). Problems. (7 h) **SHM**: Review of simple pendulum, Vertical oscillations of the light loaded spring, expression for force constant. Problems. (2 h) **Theory of compound pendulum**: Expression for time period. Reversibility of centre of oscillation and centre of suspension. Bar pendulum, determination of g and K. Problems. (4 h)	13 h
UNIT - III	**Elasticity**: Definition for elasticity, stress and strain, elastic limit, Hooke's law, stress – strain diagram, Elastic constants q, k and n - definition (Mention of practical applications) Derivation of the relation connecting the elastic constants. Poisson's ratio – definition and derivation of limiting values (Mention of practical applications). Work done in stretching a wire, work done during twisting a wire, Derivation of expression for twisting couple on a cylinder. (7 h) **Bending of beams**: Explanation, explanation of uniform and non- uniform bending with examples, definition for bending moment, derivation of the expression for bending moment, cantilever bending explanation with examples, Expression for the depression produced at the loaded end of light cantilever. I-section Girders. (Mention of practical applications). Problems. (6 h)	13 h
UNIT - IV	**Fluid dynamics:** Review of fluid and its properties with examples**.** Streamline flow, turbulent flow (examples) - critical velocity, Equation of continuity, Bernoulli's principle and its applications. (2 h) **Surface tension**: Attractive forces in a liquid –forces on the surface of a liquid- Definition of surface tension, molecular theory of surface tension - Surface energy, relation between surface tension and surface energy, illustrations of surface tension - pressure difference across curved surface- examples, excess pressure inside spherical liquid drop, discussion of angle of contact- special cases, Surface tension by drop weight method, factors affecting surface tension; Interfacial surface tension – determination	13 h

	interfacial tension by drop weight method. Problems. (6 h) **Viscosity:** Coefficient of viscosity – importance of viscosity with examples - determination of coefficient of viscosity by Poisulle's method (derivation) – terminal velocity- importance of terminal velocity -Stoke's law – Stoke's method for the determination of coefficient of viscosity (derivation), (Mention of practical applications). Problems. (5 h)	

Text Books:

1. Mechanics by, D. S. Mathur (S. Chand & Co.)
2. Mechanics and Relativity, 3rd Edition by Vidwan Singh Soni (PHI Learning Pvt. Ltd.)
3. Mechanics Berkeley Physics Course, Vol.1 by Charles Kittel, et.al. (Tata McGraw-Hill)
4. Physics for Degree Students by CL Aurora & PS Hemne (S. Chand & Co)
5. Mechanics by J C Upadhyaya (Himalaya Publishing House)
6. A Treatise on Heat by Meghnad Saha, and B. N. Srivastava, (Indian Press)
7. Heat, Thermodynamics and Statistical Physics by Brij Lal, Subrahmanyam and Hemne (S. Chand & Co.)

Reference Books:

1. Principles of Physics 9th Edition by Resnick, Halliday & Walker (Wiley)
2. Introduction to Special Theory of Relativity by Robert Resnick (Wiley Student Edition)
3. Physics for Scientists and Engineers by Jewett & Serway (Cengage learning India Pvt Ltd, Delhi)
4. The Feynman Lectures on Physics – Vol 1 by Richard P Feynman, Robert B Leighton, Mathew Sands, (Narosa Publishing House)
5. Concepts of Modern Physics by Arthur Beiser (Tata McGraw Hill)
6. Modern Physics by Kenneth Krane (Wiley)
7. Newtonian Mechanics by AP French (Viva Books)
8. Modern Physics by G Aruldhas & P Rajagopal (PHI Learning Pvt. Ltd)

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory. (4 h per week)

1	Verification of parallel and perpendicular axis theorems.
2	Determination of MI and mass of Fly Wheel.
3	Law of conservation of liner momentum by collision in two dimensions.
4	Determination of g and K using bar pendulum (two-hole method and h - T graph).
5	Determination of g by spiral spring.
6	Uniform bending – measurement of q
7	Torsion Pendulum –moment of inertia of irregular body.
8	Acceleration due to gravity, from the L – T^2 graph, for a simple pendulum.
9	Effect of mass of the bob on the time period of the simple pendulum.
10	Effect of amplitude of oscillation on the time period of the simple pendulum.
11	Inclined plane – Dependence of downward force on angle of inclination.

12	Cantilever bending – Determination of q.
13	Surface tension by drop weight method.
14	Rigidity modulus using torsion pendulum.
15	Determination of q by Koenig's Method.
16	Interfacial tension between water and kerosine.
17	Searle's double bar – determination of q, n and σ.
18	Rigidity modulus by static Torsion.
19	Viscosity by Stoke's method.
20	Viscosity by Poiseuille's method
21	Viscosity by Oswald Viscometer
22	Determination of q by stretching of wire.

Reference Books for Laboratory Experiments:

1. Advanced Practical Physics for students by B.L. Flint and H.T. Worsnop (Asia Publishing House.)
2. A Text Book of Practical Physics by I. Prakash & Ramakrishna, 11th Edition (Kitab Mahal)
3. Advanced level Physics Practicals by Michael Nelson and Jon M. Ogborn 4th Edition (Heinemann Educational Publishers)
4. A Laboratory Manual of Physics for undergraduate classes by D. P. Khandelwal (Vani Publications).
5. BSc Practical Physics Revised Ed by CL Arora (S. Chand & Co)
6. An advanced course in practical physics by D. Chattopadhyay, PC Rakshit, B. Saha (New Central Book Agency Pvt Ltd)

Semester – II
Acoustics, Relativity and Thermal Physics

Programme Name	B Sc in Physics	Semester	II
Course Title	Acoustics, Relativity and Thermal Physics		
Course Code	BSCPHYC151	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 hours
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Programme Outcomes (POs)

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcome (CO)	**Program Outcomes (POs)**					
At the end of the course students will be able to:	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
CO-1: Apply the concept of the relative motion of frame of reference with appropriate postulates of the theory of relative motion to the measurement of length, time, mass, energy and velocity.	**X**	**X**				**X**
CO-2: Apply the laws of thermodynamics and concept of heat engine to various observations.	**X**	**X**	**X**	**X**	**X**	**X**
CO-3: Explain fundamental laws of black body spectrum.	**X**	**X**	**X**	**X**	**X**	**X**
CO-4: Explain free, damped and forced oscillations, progressive waves & Fourier analysis of square wave.	**X**	**X**			**X**	**X**

II Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Paper: Acoustics, Relativity and Thermal Physics		Duration
UNIT - I	**Oscillations and Waves** **Free and forced oscillations**: Equation for a harmonic oscillator. Free oscillations and damped oscillations (practical examples). Setting up of equation for forced oscillations and its solution, condition for resonance. Problems. (4 h) **Waves**: Review of waves - Different types of waves (examples), Equation for a progressive wave in one dimension. Differential equation of wave motion, characterization of simple harmonic waves (frequency, wavelength, amplitude, phase, etc. both in graphical and mathematical), applications of waves. **Propagation of waves**: a) Longitudinal waves: i) Through fluid - Expression for velocity of longitudinal waves (derivation) – examples - Newton`s formula for velocity of sound in air and Laplace correction. ii) Through solid -Vibrations in a rod. b) Transverse waves: Velocity of transverse vibrations in a string (derivation). Expression for fundamental frequency and overtones (examples). Problems. (6 h) **Fourier's theorem**: Statement and explanation– expression for Fourier coefficients (exponential form). Limitations of Fourier theorem. Mathematical analysis of a square wave (examples). Problems. (3 h)	13 h
UNIT - II	**Relativity** **Frame of reference:** Inertial and non - inertial frames (examples**).** Galilean principle of relativity, Galilean transformation equation. space and time invariance, velocity addition theorem in inertial frames. Concept of fictitious forces with examples. Problems. (4 h) **Concept of absolute frame of reference**: Ether hypothesis. Velocity of light and failure of Galilean concepts. (2 h) **Special theory of relativity**: Postulates of special theory of relativity. Lorentz transformation (no derivation). Length contraction. Relativity of simultaneity. Time dilation- Twin paradox, Relativistic mass (mention), velocity addition theorem. Einstein's mass energy equivalence- (derivation based on photon gun experiment). Relativistic expression for kinetic energy. Relation between energy and momentum. Rest mass of the photon. Problems. (7 h)	13 h

UNIT - III	**Thermodynamics** **Thermal Physics:** Review of gas equation, energy temperature relation. Types of thermal processes. Isothermal, adiabatic, reversible and irreversible (examples). Expression for work done during isothermal and adiabatic processes (examples). Problems. (3h) I law of thermodynamics. Carnot's engine: Carnot's cycle. Efficiency of Carnot's engine. Reversibility of Carnot's engine (mention of practical engines). Refrigerator (principle only), Coefficient of performance. Derivation of Clausius - Clapeyron first latent heat equation and applications. II law of thermodynamics: Kelvin's and Clausius Statements (mention of practical examples). Problems. (7 h) **Entropy**: Change in entropy during isothermal, adiabatic, reversible and irreversible processes (examples). T-S diagram of Carnot's cycle. Problems. (3 h)	13 h
UNIT - IV	**Low temperature Physics and Radiation** **Low temperature Physics**: Ideal and real gases, liquefaction of gases (examples). Results of Andrews experiment. Joule - Thomson Effect, J - T porous plug experiment: Boyle temperature, inversion temperature and critical temperature - relation. Adiabatic demagnetization. Cryogenics. Measurements of low temperature. Problems. (5h) **Radiation**: Concept of black body, Black body radiation, energy distribution in a black body radiation. Wien's displacement law, Stefan-Boltzmann law, Wien's distribution law and Rayleigh-Jeans law. Planks hypothesis of radiation, Planks explanation of black body radiation. Derivation of Planck's law of black body radiation. Deduction of Wien's distribution law, Rayleigh-Jeans law from Planck's law. Problems. (8 h)	13 h

References books:

1. Waves and Oscillations by A. P. French.
2. Fundementals of Physics by Halliday Resnik and Walker,Wiley publications
3. Mechanics by D S Mathur S Chand publication
4. Properties of matter By Brijlal and Subramanyam, S Chand publication
5. Physics for degree students By C L Arora and P S Hemne, S Chand publication
6. College physics by N Sundarrajan:United publisher
7. Mechanics by J C Upadhyaya Himalaya publishing house Pvt Ltd.
8. Modern Physics by R Murugeshan and Kiruthiga Sivaprasath. S Chand publication

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory. (4 hours per week)

1	Velocity of sound using sonometer.
2	Frequency of ac using sonometer.
3	Study of Lissajous figures.
4	Frequency of AC by Melde's experiment
5	Specific heat of liquid by cooling.
6	Specific heat of liquid by electrical method.
7	Specific heat of a solid.
8	Platinum resistance thermometer.
9	Thermocouple – Determination thermo-emf.
10	Helmholtz's Resonator.
11	Fourier analysis of square wave.
12	Damped oscillations – Measurement of Q factor
13	Stefan - Boltzmann law.
14	Planck's constant using LED

Semester – III
Optics and Electricity I

Programme Name	B Sc in Physics	Semester	III
Course Title	Optics and Electricity I		
Course Code	BSCPHCS301	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)	**Programme Outcomes (Pos)**					
At the end of the course students will be able to:	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
CO-1: Explain the nature, theory and properties of light						
CO-2: Describe the interference of light using biprism, air wedge, Newtons rings, Michelson's interferometer.						
CO-3: Explain Fresnel and Fraunhofer diffractions of light and describe rectilinear propagation of light.						
CO-4: Explain the parts of electrical circuits, circuitary laws, transient response and solve the problems of electrical circuits.						
CO-5: Describe magnetic dipoles, ballistic galvanometer damping, circuit bridges, dielectric parameters.						

Paper: Optics and Electricity I		Duration
UNIT - I	**Theories of light:** Review of nature and theories of light, properties of light, velocity of light. (2 h) **Interference of light**: Coherent sources, Production of coherent sources, Biprism – construction, working and experiment to find wavelength, fringes with white light. Coherent sources by Amplitude division, Colors of thin films in reflected light – theory, theory and experiment of air wedge, Newton's Rings, Michelson's interferometer and applications. (11 h)	13 h
UNIT - II	**Diffraction and Laser** **Diffraction:** Introduction to diffraction- Fresnel and Fraunhofer diffraction. Fresnel's assumptions- concept of Fresnel's half period zones – Theory of rectilinear propagation of light – mention of criterion for size of an obstacle. (3 h) Fraunhofer diffraction – Single slit, double slit theory, many slits, diffraction grating, theory of normal & oblique incidence, dispersive power, resolution, Rayleigh's criterion – expression for resolving power of grating and telescope. comparison between prism and grating spectra. Problems. (7 h) **LASER:** Introduction to lasing action, properties of Laser light. Principle of Laser – Spontaneous and stimulated emissions of radiation – population inversion, methods of population inversion (qualitative). Three level lasing system. Construction and working of He-Ne Laser. Applications. Problems. (3 h)	13 h
UNIT - III	**Basics of electrical circuits** Ohm's law, Active and passive circuits, parts of electrical circuits, ideal voltage and current sources, Source transformation. KVL and KCL. Voltage and current division rules. Problems. (4 h) **Network theorems**: Superposition theorem, Thevenin's & Norton's theorems - Process of converting the given network into Thevenin equivalent and Norton equivalent. Transforming Thevenin equivalent into Norton's equivalent and vice versa. Maximum power transfer theorem. (derivation), applications. Problems. (9 h)	13 h

UNIT - IV	**Transients, Magnetic effect of a current and Dielectrics** **Transient Currents**: Theory of CR circuit (charging and discharging), LR circuit (growth and decay of current), LCR circuit (discharging). Problems. (5 h) **Magnetic effect of a current**: Force acting on a moving charge in electric and magnetic fields - Lorentz force. Force on a current carrying conductor in a magnetic field. Torque on a current loop in a magnetic field. Magnetic dipole moment – Torque on a magnetic dipole. Equivalence of a current loop and a magnetic dipole. Ballistic galvanometer – charge sensitivity – effect of damping. Theory of Andersons bridge & De-Sauty's bridge. Problems. (5 h) **Dielectrics**: Dielectric basic parameters. Polar and non-polar dielectrics. Various polarization of dielectrics – Expression for total polarization (qualitative). Applications of dielectrics. Problems. (3 h)	13 h

Reference Books:

1. Fundamentals of Optics – Jenkins and White.
2. Fundamentals of Physics by Halliday, Resnick and Walker.
3. Optics by Brijalal & Subrahmanyam.
4. Physics for degree students by C L Arora & P S Hemne.
5. College Physics by N Sunderajan
6. Optics – Khanna and Gulati.
7. A Text Book of Optics – B K Mathur.
8. A text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar and TVS Arunmurthy

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory. (4 hours per week)

S No.	Name
1	Air wedge; determination of diameter of a wire.
2	Diffraction at straight wire.
3	Diffraction grating by minimum deviation.
4	Resolving power of grating.
5	Biprism- determination of wavelength of sodium light.
6	Self-inductance by Anderson's bridge.
7	Charge sensitivity of BG
8	Tangent galvanometer; field along axis of a single coil.
9	Network theorems; Thevenin and Nortons theorems
10	Verification of maximum power transfer theorems
11	Charging and discharging of CR circuit.
12	Low resistance by potentiometer

13	B_H by using Helmholtz double coil galvanometer
14	LASER diffraction; determination of grating constant and wavelength of a Laser.
15	Verification of laws of series and parallel combinations of resistors (minimum three resistors combination)
16	Verification of voltage division law and current division law
17	Verification of KVL and KCL

Semester – III
Discipline elective / optional Paper

Programme Name	B Sc in Physics	Semester	IV
Course Title	Geophysics and Bio – Medical Physics		
Course Code	BSCPHES401	**No. of Credits**	02
Contact Hours	24	**Duration of SEA/ Exam**	02 h
Formative Assessment Marks	10	**Summative Assessment Marks**	40

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)		**Programme Outcomes (Pos)**					
At the end of the course students will be able to:		**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
i.	Obtain knowledge and understand biological importance of radiation.						
ii.	Explain geological factors of Earth: Earth crust, surface, magnetism, atmosphere, natural catastrophe.						
iii.	Explain the principle and working of medical instruments and tools.						

III Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Elective		Duration
UNIT - I	**Geophysics** Climate variations: Internal Response: Changes in atmosphere, changes in land surface, changes in ocean. The Deeper, the hotter, Earthquakes, Why is the earth hot inside, Upside Down Mountains, Floating Continents, The raise of Mountains, Terrestrial Magnetism, Physics of the atmosphere. Introduction to	8 h

	Seismology: The Earth's interior and crust as revealed by the earth quakes – Rayleigh waves. Tsunami causes and impacts. (8 h)	
UNIT - II	**Biophysics** Accommodation of the eye, Color Vision, Myopia and hypermetropia astigmatism. Speech and hearing, biological effects of radiation, medical Use of radiation, radioactive isotopes as tracers, Thermodynamics of Life. (8 h)	8 h
UNIT - III	**Medical Physics** Introduction to Medical Physics. X-rays: Electromagnetic spectrum, production of x-rays, X-ray diagnostics and imaging. CT Scan, Physics of NMR, NMR imaging, MRI radiological imaging, Ultrasound imaging, Physics of Doppler with applications. (8 h)	8 h

Reference Books:

1. Physics- Foundation and Frontiers- George Gamow, John M. Cleveland, Prentice-Hall, 1960
2. Garland, Introduction to Geophysics 11th edition, WB Saunder Company, London 1979
3. William Lowrie, Fundamentals of Geophysics 11th edition, Cambridge press, UK.
4. Physics of Radiation Therapy, F M khan- Williams and Wilkins, 3rd Edition, 2003.

Semester – IV
Optics and Electricity II

Programme Name	B Sc in Physics	Semester	IV
Course Title	Optics and Electricity II		
Course Code	BSCPHCS401	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)		**Programme Outcomes (Pos)**					
At the end of the course students will be able to:		**PO- 1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
i.	Apply various fundamental ideas of current electricity in different applications.						
ii.	Understand and apply various network theorems such as Superposition, Thevenin, Norton, Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.						
iii.	Describe the theory of ballistic galvanometer and explain various electrical networks like de-Sauty's bridge, Anderson's bridge etc., and apply them to measure various electrical quantities.						
iv.	Understand and apply the concept of transient phenomena.						
v.	Understand and apply various concepts of ac fundamentals and use them in solving problems of ac circuits.						
vi	Know the basics of electromagnetic theory and apply the ideas to solve the problems related to electromagnetic radiation.						

Paper: Optics and Electricity II		Duration
UNIT - I	**Electromagnetic theory** Scalar and vector fields with examples, del operator, gradient of a scalar function. Relation between field and potential. Integration theorems - line integral, surface integral, volume integral. Divergence and curl of a vector - physical significances. Gauss and Stokes' theorems. Problems. (6 h) Equation of continuity - setting up of Maxwell's field equations - concept of displacement current, setting up of wave equations for E & B – velocity of e. m. wave in a dielectric medium – light as e. m. wave - transverse nature of e. m. wave (proof). Poynting theorem – Poynting vector – energy density of e. m. waves. Problems. (7 h)	13 h
UNIT - II	**Polarization of light** Plane of vibration & polarization. Double refraction - optic axis. Principal section of a uniaxial crystal. Huygens theory of double refraction. Oblique incidence. Principal refractive index of double refracting crystals. Propagation of plane waves in a uniaxial crystal. Circularly and elliptically polarized light, retarding plates. Theory of quarter wave plate (QWP) and half wave plate (HWP) & uses. (11 h) Optical activity: Fresnel's theory, rotatory dispersion. Problems. (2 h)	13 h
UNIT - III	**Alternating current and Filters** **Alternating current**: Expressions for mean and r m s values of alternating voltage and current, j operator, principle of superposition and phasor analysis. Response of LR, CR and LCR circuits to sinusoidal voltages using j operators. Form factor of AC. Series and parallel resonance circuits. Sharpness of resonance – expression for the 'Q' factor, bandwidth – expression for the power. Problems. (9 h) **Filters**: High and low pass filters using CR and LR circuits, frequency response curves, cutoff frequency, qualitative study of band pass filters. Problems. (4 h)	13 h
Unit - IV	**Power transmission and Thermoelectricity** **Power transmission:** Sources of electric power. Basic structure of power system. 3- phase power transmission. Interconnection – Star or Y connection – Relation between line voltage and phase voltage. Mesh or delta connection – Relation between line current and phase current. Problems. (5 h) **Thermoelectricity:** Seebeck effect - Thermoelectric series – Thermocouple – Variation of thermo emf with temperature (qualitative). Peltier effect – Peltier coefficient – Relation between Peltier coefficient and thermoelectric power. Thomson effect – Thomson coefficient - Relation between Thomson coefficient and thermoelectric power. Thermo electric laws. Thermoelectricity applications – Thermopile, Thermoelectric cooler.	13 h

	Problems. (8 h)	

Text Books:

1. Physics for Degree Students by CL Aurora & PS Hemne (S. Chand & Co)
2. Fundamentals of Magnetism and Electricity by DN Vasudeva (S Chand & Co)
3. Electricity and Magnetism by R Murugeshan (S Chand & Co)
4. Electricity and Magnetism by K K Tiwari (S Chand & Co)
5. Electricity and Magnetism by D C Tayal (Himalaya)
6. A text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar and TVS Arunmurthy

Reference Books:

1. Physics-Part-II by David Halliday and Robert Resnick (Wiley Eastern Limited)
2. Berkeley Physics Course, Vol-2, Electricity and Magnetism, Special Edition by Edward M Purcell (Tata Mc Graw-Hill Publishing Company Ltd, New Delhi)
3. Physics for Scientists and Engineers by Jewett & Serway (Cengage learning India Pvt Ltd, Delhi)
4. The Feynman Lectures on Physics – Vol II by Richard P Feynman, Robert B Leighton, Mathew Sands, (Narosa Publishing House)

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory. (4 hours per week)

1	Newton's ring: Radius of curvature of plano convex lens
2	Verification of superposition Theorem.
3	Low resistance by Carey-Foster bridge
4	Law of combination of capacitance by de-Sauty's bridge.
5	M and C by Carey – Foster bridge
6	Frequency response of Low pass and high pass filters.
7	Self-inductance by phasor diagram and reactance method
8	Parallel resonance – Resonant frequency, bandwidth and quality factor.
9	B_H by using tangent galvanometer
10	High resistance by leakage – BG.
11	Mutual inductance using BG.
12	Earth inductor – B_H, B_V and dip at the place
13	Polarimeter; specific rotation of sugar solution.
14	Diffraction grating by normal incidence method.
15	Dispersive power of a prism.
16	Growth and decay of current in LR circuit.
17	

Reference Books for Laboratory Experiments:

1. Advanced Practical Physics for students by B.L. Flint and H.T. Worsnop (Asia Publishing House.)
2. A Text Book of Practical Physics by I. Prakash & Ramakrishna, 11th Edition (Kitab Mahal)
3. Advanced level Physics Practicals by Michael Nelson and Jon M. Ogborn 4th Edition (Heinemann Educational Publishers)
4. A Laboratory Manual of Physics for undergraduate classes by D. P. Khandelwal (Vani Publications).
5. BSc Practical Physics Revised Ed by CL Arora (S. Chand & Co)
6. An advanced course in practical physics by D. Chattopadhyay, PC Rakshit, B. Saha (New Central Book Agency Pvt Ltd)

Semester – IV
Discipline elective / optional Paper

Programme Name	B Sc in Physics	Semester	IV
Course Title	Astrophysics, Space mission and Indian knowledge system		
Course Code	BSCPHES401	**No. of Credits**	02
Contact Hours	24	**Duration of SEA/ Exam**	02 h
Formative Assessment Marks	10	**Summative Assessment Marks**	40

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)		**Programme Outcomes (Pos)**					
At the end of the course students will be able to:		**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
i.	Obtain knowledge and understand the basics of Astrophysics						
ii.	Explain the birth and evolution of various mass stars.						
iii	Explain the birth and evolution of						

	Universe using Big bang, Steady state and Pulsating theories.						
iii.							

III Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Discipline Elective: Astrophysics, Space mission and Indian knowledge system		Duration
UNIT - I	**Stellar coordinates and parameters** (8 h)	8 h
UNIT - II	**Evolution of stars and Universe** (8 h)	8 h
UNIT - III	**Indian knowledge system** (8 h)	8 h

Reference Books:

Semester – IV
Compulsory Skill / Practical
Maintenance of Opto - Electrical – Electronic equipments / devices

Programme Name	B Sc in Physics	Semester	IV
Course Title	Maintenance of Opto - Electrical – Electronic equipments / devices		
Course Code	BSCPHIS401	No. of Credits	02
Contact Hours	24	Duration of SEA/ Exam	Viva-Voce
Formative Assessment Marks	10	Summative Assessment Marks	40

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Pre - requisites: PUC Science Knowledge	**Programme Outcomes (Pos)**					
Course Outcomes (CO): After Successful completion of the course, the students will be able to	**PO- 1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
1. Understand and explain various circuitary laws. 2. Obtain the knowledge about the structure of electrical and electronic devices. 3. Demonstrate practical use of electrical and electronic circuits. 4. Obtain a skill of repairing electrical/ electronic equipments / home appliances.						

	Maintenance of Opto - Electrical – Electronic equipments / devices	Duration
UNIT - I	Basics of geometrical optics. Convex and concave lenses / mirrors. Principle, working and maintenance of travelling microscope, biological microscope, spectrometer, reflector and refractor telescopes. Drone and CC cameras working principle and maintenance. Basics of Electricity - Electric current, Ohms law, emf, Electric Power, KWh, generator, reactance, impedance, capacitor, inductor, choke & transformer. Introduction to Current and voltage measuring instruments: AC & DC Ammeter, AC & DC Voltmeter, watt hour meter, Potentiometer, Multi meter.	8 h
UNIT - II	Working principles of regulated power supply, function generators. Use of CRO –Measurement of frequency/voltage/phase difference. Basic working principle of Radio/TV. Mobile phones – Chargers. Remote controllers – Bluetooth - 2G/3G/5G. Concept of GPRS. Digital devices – digital measuring instruments-digital display-Digital Camera-Resolution– Pixels-advantages and limitations-Digital Zoom-Optical Zoom. Digital storage devices- Pen drive.	8 h

UNIT - III	Working of switches (1-way 2-way), Principle and working of regulator, principle and working of starter and chokes, Domestic wiring -Application of Fuses, ELCB (Earth Leakage Circuit Breaker) Principle and working of lightning arrester-precautions during lightning-, Principle and working of Iron box, Mixer grinder-induction coil- Principle and working of filament bulb, tube light and LED bulbs, Working of ceiling & table fan, working of Mixer and Grinder, Working of Fridge/ AC/-washing machine. Smart electrical devices	8 h

Semester – V
Quantum mechanics and Spectroscopy

Programme Name	B Sc in Physics	Semester	V
Course Title	Quantum mechanics and Spectroscopy		
Course Code	BSCPHCS501	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)		Programme Outcomes (Pos)					
At the end of the course students will be able to:		**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
i.	Explain Dual nature of matter with aid of number of experimental results.						
ii.	Describe fundamentals of Quantum mechanics: Wave function, setting of Schrodinger wave equations, normalization of wave functions, expectation values, Eigen values and functions.						
iii.	Explain atomic models, quantum numbers associated with vector atom model, selection rules, coupling schemes, Bohr magneton, Stern-Gerlach experiment, Zeeman effect.						
iv.	Explain regions molecular spectra, rotational spectra, vibrational spectra, electronic spectra and their applications.						
v	Describe scattering of light: Rayleigh scattering, Raman scattering their applications in solving specific problems.						

Paper 1: Quantum mechanics and Spectroscopy		Duration
UNIT - I	**Foundation of Quantum mechanics** Evidences of Quantum nature of light: Photoelectric effect (Einstein's equation only), Compton effect – expression for Compton shift using relativistic expressions for momentum and energy. Problems. (3 h) Wave nature of particles: De-Broglie waves, Phase and group velocity of waves, Davisson and Germer experiment. Principle of electron microscope, difference between optical and electron microscope. Uncertainty principle, three sets of uncertainty relations, γ-ray microscope. Application of uncertainty relation – estimation of width of spectral lines, impossibility of the existence of electrons inside the nucleus. Problems. (10 h)	13 h

UNIT - II	**Quantum Mechanics** Wave function, need to represent wave function in a complex form, properties of wave function. Setting up of time dependent Schrodinger wave equation and to arrive at the time independent wave equation. Expectation values. Eigen values and Eigen functions. Normalization of wave functions. Solution of Schrodinger equation (i) for a free particle (ii) a particle in a one-dimensional box. Graphs of ψ and $\|\psi\|^2$. Extension to three-dimensional box. Degeneracy. Problems. One dimensional harmonic oscillator (qualitative), zero-point energy of harmonic oscillator-using uncertainty principle. (13 h)	13 h
Unit-III	**Atomic models and spectra** Atomic models, Concept of Spatial & spin quantization of electrons. Different quantum numbers associated with vector atom model, spectral terms and their notations, selection rules, coupling schemes, L-S and J-J coupling. Pauli's exclusion principle. Expression for maximum number of electrons in an orbit. Fine structure of Sodium D-line, Larmour precession, Bohr magneton, Stern-Gerlach experiment. Zeeman effect, experimental study of Zeeman effect, theory of normal Zeeman effect. (13 h)	13 h
UNIT IV	**Molecular Spectra & Scattering** Different regions of molecular spectra, pure rotational spectra of diatomic molecules, vibrational rotational spectra of diatomic molecules, electronic spectra. Theory of origin of pure rotational spectra – rigid rotator. Theory of origin of pure vibration spectra. Application of molecular spectra. Electronic spectra of molecules, Fluorescence & phosphorescence. Problems. (6 h) Coherent & incoherent scattering. Rayleigh scattering. Blue color of the sky. Raman effect. Experimental arrangement, quantum theory of Raman effect, characteristic properties of Raman lines. Intensity, depolarization ratio of Raman lines. Comparison of Raman shift with IR spectra, rule of mutual exclusion, applications Raman effect diatomic & triatomic molecules. Raman scanner. Laser-Raman spectroscopy. Problems. (7 h)	13 h

Books for reference:

1. Concepts of Modern Physics 6th Edn. – Arthur Beiser

2. Introduction to Atomic and Nuclear Physics 5th Edn – Semat & Albright
3. Modern Physics – Kenneth S Krane
4. Fundamentals of Molecular spectroscopy, 4th Edn – Banwell
5. Quantum Physics – A P French
6. Quantum Physics, Vol IV – E Wichman, Berkeley Physics Course
7. Quantum Physics – Gasorovicz
8. Modern Physics – Murugeshan
9. Quantum Physics - G Aruldhas

Semester – V
CMP and Semiconductor Devices

Programme Name	B Sc in Physics	Semester	V
Course Title	CMP and Semiconductor Physics		
Course Code	BSCPHCS502	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Pre - requisites: PUC	**Programme Outcomes (Pos)**

Science Knowledge						
Course Outcomes (CO): After Successful completion of the course, the will be able to	**PO-1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
1. Explain different distribution laws used in statistical Physics						
2. Describe and compare various specific heat of solids and their limitations.						
3. Understand the importance of new materials and their applications.						
4. Explain X -ray spectra, crystal planes.						
5. Describe the Superconducting planes of various materials with their experimental facts.						
6. Explain the classification of solids on the basis of band theory of solids.						
7. Demonstrate graphically electrical behaviors of various semiconductor devices.						

Paper 2: Condensed Matter Physics		Duration
UNIT - I	**Statistical Physics:** Introduction, Micro & Macro states of a system, statistical (macroscopic) variables (P V T) or (P V N) or (E V N), Canonical ensembles & Comparison. Classical statistics (system) - M B distribution law, Quantum Statistics (system) - BE & FD distribution laws. Comparison between MB, BE & FD distribution laws. (3 h) **Specific heat of Solids:** Introduction, definition for specific heat, atomic heat and phonon. Classical (Dulong - Petit's law) theory of specific heat of solids (qualitative). Einstein's theory of specific heat of solids (derivation & graph). Debye's theory of specific heat of solids (derivation & graph). Problems. (7 h) **New materials: Nano materials** - Classification, production (sol - gel process), properties, applications. Piezo - electric and ferro electric materials, their electrical properties and applications. (3 h)	13 h
	X - Rays: Production of X -ray using Coolidge tube, Origin of X - ray spectrum (continuous and characteristics), Duane - Hunt's law, Moseley's law, Bragg's law (derivation), Bragg's spectrometer. Problems. (3 h) **X - ray crystallography:** Crystalline solids; single and polycrystalline solids, space lattice - basis - crystal structure, unit cell. Seven crystal system. Miller indices, planes of cubic crystal, interplanar spacing d_{hkl} for	

UNIT - II	cubic system (derivation). Measuring lattice parameters (volume, effective number of atoms, coordination number, atomic packing fraction and density) of SC / FCC system. Problems. (6 h) **Superconductivity:** Superconductivity phenomenon, transition temperature T_c. T_c for Hg, Pb, In, Cd materials. Properties of superconductors: Electrical resistance, persistent current, critical temperature, critical magnetic field, critical current density. Experiment facts of superconductivity; Meissner effect, Isotope effect, Josephson effect, BCS theory, Entropy, High temperature Superconductivity, Application of superconductors. Problems. (4 h)	13 h
UNIT - III	**Band theory of solids:** Free electron theory of metals a glance (Mention the expressions for electrical conductivity of a metal, Fermi energy at T = 0 K & T > 0 K). Failure of free electron theory of metals. Band formation in solids with Li as example, meaning of filled energy band, valance band, conduction band, valance electron and conduction electrons. Classification of solids into insulator, semiconductor and conductors with E - B diagrams describing electrical conductivity. Intrinsic semiconductor: concept of hole formation, E_F level (derivation), electrical conductivity (derivation). Extrinsic semiconductors; n - type and p - type, their electrical conductivity expressions, P - N junction, forward and reverse bias of P - N junction with E - B diagrams and expressions for diode currents. Problems. (11 h) **Hall effect:** Theory and experimental measurement of Hall coefficient. Problems. (2 h)	13 h
UNIT - IV	**Semiconductor devices:** P - N diode: V-I characteristics & application. Zener diode: V-I characteristics & application. LED: Construction, mechanism & application. Tunnel diode characteristics & its application. BJT - input & output characteristics. J FET (n channel) - Transfer and drain characteristics. e -MOSFET - Transfer and drain characteristics. Comparison between BJT and FET. Thermistor. Solar cell - I-V characteristics and applications. Opto - electronic devices: LDR photo conductor, photo diode and photo transistor I-V characteristics and applications. Photo multiplier tube. Laser diode. SCR and UJT V-I characteristics and their applications. Problems. (13 h)	13 h

References:

Text Books:

1. Solid State Physics - R K Puri and V K Babber., S Chand Publications, 1st Edition (2004).
2. Fundamentals of Solid State Physics - B S Saxena, P N Saxena, Pragati prakashan Meerut (2017).
3. Introductory Nuclear Physics by Kenneth S Krane (Wiley India Pvt. Ltd., 2008).
4. Nuclaer Physics, Irving Kaplan. Narosa Publishling House.
5. Semiconductor Devices Physics and Technology 2nd Edn – S M Sze

Reference Books:

1. Introduction to solid state Physics, Charles Kittel, VII edition, (1996)

2. Solid State Physics - A J Dekker, MacMillan India Ltd, (2000)
3. Essential of Crystallography, M A Wahad, Narosa Publications (2009)
4. Solid State Physics - S O Pillai - New Age Int. Publishers (2001).

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory.

Sl. No.	Name of the Experiment
1	Determination of energy gap of a semiconductor.
2	Determination of quantum efficiency of photodiode
3	Determination of fermi energy of copper.
4	Thermistor; determination of energy gap.
5	Specific charge of an electron
6	Hysteresis; study of magnetization of ferromagnetic material.
7	Rydberg constant using source Hydrogen lamp / Solar spectrum
8	Intensity of a spectral line using LDR photoconductor
9	Determination of Cauchy's constants using spectrometer
10	Diode characteristics (P – N diode, zener diode and LED)
11	Transistor Characteristics
12	Measurement of Hall coefficient of a semiconductor
13	Solar cell I-V characteristics
14	FET characteristics
15	Photo transistor characteristics
16	SCR characteristics
17	UJT characteristics
18	Absolute Capacity by using BG.
19	Study the attenuation of absorption of gamma rays in polymeric materials using Cs-137 source and G M counter.
20.	

Semester – VI
Nuclear Physics

Programme Name	B Sc in Physics	Semester	VI
Course Title	Nuclear Physics & Elementary Particles		
Course Code	BSCPHCS601	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 hours
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Pre - requisites: PUC Science Knowledge	**Programme Outcomes (Pos)**					
Course Outcomes (CO): After Successful completion of the course, the students will be able to	**PO- 1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
1. Describe the processes of alpha, beta and gamma decays based on well-established theories.						
2.						

VI Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Paper 1: Nuclear Physics & Elementary Particles		Duration
UNIT - I	**Nuclear Decay and Spectra of Nuclear Radiation** Successive disintegration (A □ B □ C), expression for number of daughter nuclei, radioactive equilibrium - transient and secular, radioactive series, radioactive dating - radio uranium and radio carbon dating. Alpha decay, alpha particle disintegration energy, alpha ray spectra, range, velocity and energy relations. Geiger-Nuttal Law. Beta ray spectra and paradoxes, Pauli's neutrino hypothesis, modes of beta decay. Gamma ray emission, interaction of gamma rays with matter - photo electric effect (mention), Compton effect (mention) and pair production. Absorption of gamma rays by matter and absorption coefficient. Nuclear radiations-units: Curie, Becquerel, Absorbed dose rate – G ray and dose equivalent - Sievert - definitions. Problems. (13 h)	13 h

UNIT - II	**Artificial Transmutation of Elements & Nuclear reactions Nuclear Structure** Rutherford experiment, Q values of nuclear reactions, threshold energy for endoergic nuclear reaction, Types of nuclear reactions. Discovery, classification and properties of neutron. Neutron sources (mention), interaction of neutrons with bulk matter. Problems. Rutherford alpha scattering formula assuming impact parameter - nuclear cross section - differential and total. Mass spectrographs - Dempster's mass spectrograph. Characteristics of nuclear forces, Yukawa's theory, estimation of mass of mesons using uncertainty principle. (13 h)	13 h
UNIT - III	**Nuclear models & Nuclear Energy** Nuclear models: Liquid drop model and explanation of nuclear fission, semi empirical mass formula, Shell model and magic numbers. Salient features of liquid drop model and shell model. Nuclear fission: C ritical Mass, critical size. Nuclear power reactor. Four factor formula. application. Nuclear fusion plasma confinement, Magnetic bottle C-N cycle & p-p Cycle. Stellar Energy. Problems. (13 h)	13 h
UNIT - IV	**Particle Accelerators, Detectors Cosmic rays & Fundamental Particles** **Accelerators**: Linear accelerators, Cyclotron and Betatron, Microtron (principle only). **Detectors**: Gas filled counters - G M counter - construction and working, principle of scintillation and semiconductor detectors. Problems. **Cosmic rays**: L atitude and altitude effect, east west effect, primary and secondary cosmic rays and composition, origin of cosmic rays, cosmic ray showers, Van Allen Radiation belts, Aurorae. **Fundamental particles**: General properties - Dirac concept of anti-particles - classification based on interactions. Leptons and Hadrons. Quarks model and mediators of basic interactions. Problems. (13 h)	13 h

Books for reference:

1. Concepts of Modern Physics, 6 Edn, Beiser
2. Modern Physics – Berstein, Fishbane, Gasirowiez
3. Modern Physics – K.S. Krane
4. Introductory Nuclear Physics – K.S. Krane
5. Introduction to Atomic and Nuclear Physics, 5th Edn., Semat & Albright
6. Quantum Physics of Atoms, Molecules, Solids, Nuclei & Particles, 2nd Edn, Eisberg & Resnick
7. Nuclear Physics – Irving Kaplan
8. Modern Physics – Murugesan

Semester – VI Paper 2 - Electronics

Programme Name	B Sc in Physics	Semester	VI
Course Title	Electronics		
Course Code	BSCPHCS602	**No. of Credits**	03
Contact Hours	52	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Pre - requisites:	**Programme Outcomes (Pos)**					
Course Outcomes (CO): After Successful completion of the course, the will be able to	**PO- 1**	**PO- 2**	**PO- 3**	**PO- 4**	**PO- 5**	**PO- 6**
1. Describe and construct BJT and FET applications.						
2. Explain various configurations of OPAMP and their applications.						
3. Describe the working of Wein bridge oscillator satisfying Barkhausen criteria.						
4. Explain individual components of regulated power supply and their modification.						
5. Demonstrate different modes of communication electronics.						
6. Understand and explain logical functions of basic logic gates and						

sequential circuits of digital electronics.						

VI Semester B Sc Physics (MU) Syllabus for SEP 2024 Karnataka

Paper 2: Electronics		Duration
UNIT - I	**BJT Amplifiers:** Configurations of BJT. Current gains -Relation between α_{dc} and β_{dc}, Biasing of BJT in CE mode - Voltage divider bias. DC load - line and location of Q point. CE amplifier: DC and AC equivalent circuits, Amplifier characteristics, h - parameter model of transistor (CE mode), AC analysis of CE amplifiers, Frequency response (CE amplifier). Comparison between CE, CB and CC amplifiers. Cascading - Two stage CE amplifier (qualitative). Problems. (7 h) **FET Amplifiers:** FET Biasing: Self bias of n channel JFET, DC load line - Q point ($I_{D_{min}}$, $I_{D_{max}}$, $I_{Ds_{min}}$, $I_{Ds_{max}}$) determination. Gate biasing of n - channel E - MOSFET - Draw bias line & Q point in transfer characteristics. Common source amplifier using n - channel JFET - AC analysis and frequency response. Problems. (6 h)	13 h
UNIT - II	**OPAMP & Oscillator** **Operational amplifier (OPAMP)**: BJT deferential amplifier & its configurations - DC analysis of Dual input balanced output BJT differential amplifier. OPAMP: Symbol, equivalent circuit, characteristics of Ideal OPAMP. IC 741: Pin configuration, Characteristics, Frequency response. OPAMP configurations: Open loop, closed loop, OPAMP as inverting and non-inverting amplifiers (closed loop) - concept of virtual ground, expressions for voltage gainA_v,R_{in} , R_{out}. Application of OPAMP (any two): Adder, subtractor. Problems. (8 h) **Oscillator:** Concept of feedback, positive and negative feedbacks, comparison - Expression for gain with feedback - condition for oscillation - Barkhausen criteria. Wein bridge oscillator - construction and working - advantages and disadvantages. Problems. (5 h)	13 h
UNIT - III	**Regulated Power Supply & communication Electronics:** **Regulated Power Supply (RPS):** Block diagram of RPS, Full wave bridge rectifier - construction - working with waveforms - expression for ripple factor, efficiency - percentage of voltage regulation - Filters - explanation for C filter. Zener voltage regulator - line and load regulations - limitations - OPAMP voltage regulator (qualitative). 3 pin IC regulators: IC 78XX series, 79xx series, LM 317 as adjustable voltage and current regulators. Problems. (7 h) **Communication Electronics:** Need for modulation. AM wave: Expression for AM wave - Expression for powers of carrier and side bands & total power - Band width. FM wave (qualitative), Demodulation using diode detector. Block diagram of satellite communication. Optical communication system	13 h

	(block diagram) - Expression for numerical aperture and attenuation coefficient of OFC (mention only). Mobile communication. Problems. (6 h)	
UNIT - IV	**Digital Electronics:** Basics of computer (Block diagram) - Machine language - RAM - ROM - SSD. Number systems - conversion from binary to decimal, vice - versa. Problems. (2 h) **Logic gates:** Basic logic gates - OR, AND, NOT gates construction using discrete components (symbol, truth table, operations, logical equations, logical decisions). EXOR gate - Symbol, truth table, logical expression. NAND gate as universal gate (construct NOT, AND, OR & EXOR gates using NAND gates). Pin configurations of OR, AND, EXOR, NAND gates ICs. (4 h) **Boolean Algebra:** Basic laws. De - Morgan's theorems - Proof using truth table. Solution and logical diagrams to Boolean expressions. Sum of product method - Simplification of SOP equations and drawing logical diagrams. Half adder and Full adders. Problems. (3 h) **Sequential circuits**: Flip flops: R - S flip flop, clocked R - S flip flop (use NOR gate) - Explanation with truth table. J - K flip flop, D - flip flop (qualitative). **Shift register:** 4 bit serial shift register. **Counters:** 4 bit Ripple counter with timing diagram. Counter - BCD - 7 segment display (Block diagram), 7 segment display. Problems. (4 h)	13 h

Reference:

1. Electronic Devices and circuits - 5th Ed by David A Bell, Oxford Higher Education
2. A text book of Engineering Physics - M N Avadhanulu, P G Kshirsagar, TVS Arun Murthy - S Chand
3. OP-AMPs and Linear integrated circuits 3rd Ed - Ramakanth A Gayakwad - EEE
4. Microelectronics - 2nd Ed - Jacob Millman Arvin Grabel - TATA Mc GRAW - Hill
5. Digital Fundamentals 10th Ed - Thomas L Floyd - Pearseon.
6. Semiconductor Devices Physics and Technology 2nd Edn – S M Sze

List of Experiments to be performed in the Laboratory: A minimum of 8 experiments to be carried out in the laboratory.

Sl. No.	Name of the Experiments
1	Study the characteristics of Geiger-Mùller Tube. Determine the threshold voltage, plateau region and operating voltage.
2.	Study the absorption of beta particles in aluminium foils using GM counter. Determine mass attenuation coefficient of aluminium foils.
3.	Study the absorption of beta particles in thin copper foils using G M counter and determine mass attenuation coefficient.
4.	Study the attenuation of gamma rays in lead foils using Cs-137 source and G M counter. Calculate mass attenuation

	coefficient of Lead for Gamma.
5	Full wave bridge rectifier
6	Zener voltage regulator
7	3 pin IC voltage regulator using LM 317
8	CE amplifier – Frequency response.
9	Amplitude modulation and demodulation
10	OP-amp inverting, non-inverting and difference amplifier
11	OPAMP adder and subtractors
12	Wein bridge oscillator
13	Measurement of attenuation coefficient & numerical aperture of OFC.
14	Stefans law verification
15	Construction of OR, AND, NOT, NAND & NOR gates using discrete components
16	Basics Logic gates using NAND gates.
17	BJT differential amplifier (two configurations)
18	Half adder & full adder using ICs.
19.	Common source amplifier using JFET.

Distribution of marks SEP- 2024 for all the Semesters

I, II, III, IV, V and VI of B Sc (Physics theory exams) - Mangalore University

Internal Assessment : 20 (max. marks per paper). Average of two tests

Semester Examination: 80 (max. marks per paper)

Total : 100 (max. Marks per paper)

Question paper pattern

Reg No. | | | | | | | | | | |

---------- (Paper Code)

--------- Semester B.Sc. Examination, ----------(Month) 2024

(SEP - 2024) (2024-2025 Batch Onwards)

PHYSICS (DSC)

(Title) ----------

Time: 03 Hours Max. Marks: 80

Instructions: i) Answer questions from **all** Parts.

ii) Scientific calculators are **allowed**.

Part A

I. Answer any **Eight** (answer 8 out of 10) questions **1×8 = 8**

II. Answer any **Six** (answer 6 out of 8) questions **2×6 = 12**

Part B

Answer One full question (1 out of 2) from each unit (I, II, III & IV)

Questions carrying 4 marks $1 \times 4 = 4$

Questions carrying 7 marks $1 \times 7 = 7$

(Total of each unit 4+7 =11)

(Total of four units **4× 11= 44**)

Part C

Problems. Answer any four (4 out of 6 at least 1 problem from each unit) **4 × 4 = 16**

Total of Part A, part B and Part C (8+12+44 +16 = 80) **= 80**

Distribution of marks in Practical exams:

Allotment of marks	**I, II, III & IV Semester**	**V & VI Semester**
Formula	3	5
Circuit & diagram	3	5
Setting of the experiment	4	10
Observation & trails	10	20
Calculation & graph	3	15
Result & accuracy	3	5

Viva - Knowledge of the experiment	4	10
Record marks	10	10
Total marks	**40**	**80**
Internal examination & continuous evaluation	10	20
Total Marks	**40+ 10 = 50**	**80 + 20 = 100**

Guidelines for subject with practicals regarding student-teachers ratio for conducting practicals in SEP-2024:

1. Practical batches should be formed in units 10 students in a batch for 1 teacher.
2. Under no circumstances there will be more than 20 students in batches and more than 2 teachers in a batch.
3. If, for some reason practical batches cannot be formed strictly as per above pattern, the following student -teachers ratio pattern shall be strictly followed.

For degree classes in SEP-2024 - student-teachers ratio

Si. No.	Student strength in class of practical's	Number of teachers to be assigned
1	Up to 15	1
2	From 16 to 27	2
3	From 28 to 35	3
4	From 36 to 47	4
5	From 48 to 55	5
6	From 56 to 67	6
7	From 68 to 75	7
8	From 76 to 87	8
9	From 88 to 100	9

Third Semester B.Sc.

BSCCHCS301: Chemistry Theory-III

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following basic aspects of chemistry:

1. The general characteristics and properties of d and f block elements.
2. The characteristic properties and occurrence of lanthanides and actinides in nature and their uses.
3. Various liquid mixtures and their separation techniques.
4. Chemistry of phenols, ethers, epoxides, structure and reactivity of carbonyl compounds.
5. Concepts of acids and bases with respect to various compounds.
6. Nano-chemistry and the applications nano-materials, food technology and corrosion.
7. Thermodynamics and its applications to physical and chemical systems.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. Distinguish between d and f block elements by studying their general properties.
2. Understand the concept of lanthanides, actinides and their comparisons.
3. Understand the principles of thermodynamics and its applications to physical and chemical systems.
4. Describe the chemistry of phenols, ethers, epoxides and structure and reactivity of carbonyl compounds.
5. Gain the knowledge and skills of preparation of nano-materials.
6. Understand various liquid mixtures and their separation techniques.
7. Understand the basic concept of food technology and corrosion.

UNIT–I

Thermodynamics **[14 Hours]**

First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat Capacity, heat capacities at constant volume and pressure and their relationship. Joule's law, Joule - Thomson coefficient and inversion temperature. Bond dissociation energy and its calculation from thermo-chemical data. Temperature dependence of enthalpy. Kirchhoff's equation.

Second Law of Thermodynamics: Need for the Law, different statements of the Law. Carnot cycle and its efficiency, Carnot theorem. Thermodynamic scale of temperature. Concept of entropy, entropy as a state function, entropy change for an ideal gas as a function of V & T, entropy as a function of P & T, entropy change in physical changes- fusion, evaporation, sublimation and transition. Entropy changes in mixing of ideal gases. Entropy as a criterion of spontaneity and equilibrium.

Third Law of thermodynamics: Significance, unattainability of absolute zero. Gibbs and Helmholtz functions; Gibb's function (G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity. Variation of G with P, V and T (Illustrative problems to be worked out).

UNIT–II

Chemistry of d-Block Elements **[6 Hours]**

Introduction, General characteristics of transitional elements, general electronic configuration, stabilities of oxidation states, complexing ability, colour, magnetic property-expression for magnetic moment-spin only formula μs, calculation of μs for 3d series elements, Reasons for observed trend, Comparative treatment of 4d, 5d series with their analogues in respect of ionic radii, oxidation states, magnetic behavior and stereochemistry.

Chemistry of f-Block Elements **[4 Hours]**

Introduction, Lanthanide contraction, Causes of lanthanide contraction, Occurrence, Isolation of lanthanides by ion-exchange method, Similarities and comparison between lanthanides and actinides, Separation of neptunium, Plutonium and americium and uranium. Problems on calculation of μ_{S+L} for trivalent lanthanide ions.

Nano Chemistry **[4 Hours]**

Introduction, General methods of synthesis, characterization techniques, Scanning Electron Microscopy (SEM)-Principle and method of determination of nanomaterials, advantages over other microscopes, Fullerenes, Preparation of nanoparticle by chemical method, Applications of nanomaterials.

UNIT-III

Reactions and Reactivity of Phenols **[4 Hours]**

Comparison of acidic properties of phenols with carboxylic acids, alcohols and carbonic acid. Molecular rearrangements-Fries rearrangement, Claisen rearrangement, Synthesis of aryloxy acetic acids.

Structure and Reactivity of Carbonyl Compounds **[7 Hours]**

Structure of carbonyl group, Nucleophilic additions to carbonyl group, relative reactivities of aldehydes and ketones-explanation, Mechanism of reactions involving-Hydride shift-Tischenko reaction, i) C-C bond formation-Bucherer hydantoin synthesis, ii) C=C bond formation-Wittig reaction, iii) C=N bond formation-addition of NH_3 derivatives, iv) C-O bond formation-Acetal synthesis, Michael addition-α, β-unsaturated aldehydes and ketones.

Ethers and Epoxides **[3 Hours]**

Chemical reactions of ethers-Cleavage and auto-oxidation with examples. Zeisel's method. Synthesis of epoxides, Acid and Base catalyzed ring opening of epoxides, Orientation of epoxide ring opening with energy profile diagram.

UNIT-IV

Acids and Bases **[3 Hours]**

Lewis concepts of acids and bases. Modern concepts of acids and bases. Usanovich concept, Lux-Flood concept. Hard and Soft Acids and Bases (HSAB): Classification of acids and bases as hard and soft. Pearson's HSAB concept and its applications.

Binary Mixtures **[7 Hours]**

Liquid-Liquid Mixtures: Ideal liquid mixtures, Raoult's law. Non-ideal system; Azeotropes: HCl-H_2O and ethanol-water systems. Partially miscible liquids: Phenol-water, trimethyl amine-water and nicotine-water systems. Lower and upper consolute (critical solution) temperature. Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst

distribution law: Definition and applications (Illustrative problems on steam distillation to be worked out).

Food Technology [2 Hours]

Introduction to food chemistry, Fundamentals of food processing, Fundamentals of milk processing, Food analysis, Food packing technology, Food laws and quality assurance.

Corrosion Chemistry [2 Hours]

Corrosion: Introduction, Corrosion-an electrochemical phenomenon. Types of corrosion-Galvanic corrosion, Crevice corrosion, Erosion corrosion, Stress corrosion.

BSCCHCS302: Chemistry Practicals-III

Qualitative Analysis of Inorganic Salt mixture

[Total number of Practical Hours: 4 Hours/Week (14x4=56 Hours)]

Course Learning Objective: To understand the concepts and develop the skill of inorganic salt analysis.

Course Outcome: After the completion of the course, the student will develop the skill to analyse the radicals present in inorganic salt mixtures.

Semi Micro Qualitative Analysis of Inorganic Salt Mixture

Systematic qualitative analysis of mixture of two simple inorganic salts (containing two cations and two anions)

Anions: CO_3^{2-}, HCO_3^-, SO_3^{2-}, S^{2-}, CI^-, Br^-, I^-, NO_3^-, BO_3^{3-}, PO_4^{3-}, SO_4^{2-},

Cations: Pb^{2+}, Cu^{2+}, Bi^{3+}, Cd^{2+}, C_O^{3+}, Ni^{2+}, Al^{3+}, Fe^{3+}, Mn^{2+}, Zn^{2+}, Ca^{2+}, Ba^{2+}, Sr^{2+}, Mg^{2+}, Na^+, K^+, NH_4^+.

Note: First experiment should be exclusively used for explaining the basic principles of qualitative inorganic analysis and demonstration.

Reference Books

1. A Text Book of Inorganic Chemistry by P. L. Soni, 1998, Sultan Chand and Sons.
2. A Text Book of Inorganic Chemistry by Puri and Sharma, 2000, Shobanlal Nagin Chand.
3. Advanced Inorganic Chemistry by Gurudeep Raj, 2008, Goel.
4. A Text Book of Inorganic Chemistry by Sathya Prakash, 2001, S Chand & Company.
5. Engineering Chemistry by B. K. Sharma, 2001, Krishna Prakashan.

6. Nanomaterials by A. K. Bandyopadhyay, 2008, New Age.
7. Nano Science and Technology by V. S. Muralidharan and A. Subramania, 2009, Ane Books.
8. An Introduction to Metallic Corrosion and its Prevention by Raj Narayan, 1988, Oxford and IBH.
9. Vogel's Textbook of Practical Organic Chemistry (including Qualitative Organic Analysis by A. l. Vogel, 1974, Longman.
10. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor, 2017, New Age.
11. Food Science and Technology by P. Dev Raj, 2011, New Age.
12. A Text Book of Food and Beverage Management by Sudhir Andrews, 2008, McGraw Hill.

Discipline Elective (Optional)

BSCCHES303: Laboratory Reagents, Domestic Chemicals and Safety

[Total number of Lecture Hours: 2 Hours/Week (2x14=28 Hours)]

Course Learning Objectives

This course helps to understand the following basic aspects of chemistry:

1) Understand general laboratory protocols and safety practices.
2) Assess and minimize laboratory hazards.
3) Respond to laboratory emergencies and report incidents.
4) Explore the role of serendipity and master reagent preparation.
5) Understand the chemistry of common cleansing agents.
6) Identify the composition and uses of household items.
7) Explore the role of chemicals in cosmetics and personal care products.
8) Analyze the function of stain removers and their common types.

Course Outcomes: On completion of this course, the student will be able to appreciate the following aspects:

1) Apply standard laboratory protocols and safety practices.
2) Assess and manage laboratory hazards and emergencies.
3) Recognize the role of serendipity in scientific discoveries.
4) Prepare and safely handle laboratory reagents and equipment.

5) Understand the composition and function of cleansing agents.
6) Analyze the chemistry of common household items.
7) Evaluate the components and applications of cosmetic products.
8) Relate chemical properties to real-life applications in the home.

UNIT-I

Laboratory Safety **[4 Hours]**

Introduction. General laboratory protocols: Basic rules, Good Laboratory Practices. Chemical hazards, safety data sheets, symbols and hazard information, storage procedure, Physical hazards, Health hazards, Reaction hazards. Assessing the risks of hazards. Minimizing the risks of hazards: fume hood, ventilation, fire extinguisher, personal protective equipment's, Preparedness for emergencies from uncontrolled hazards: Importance of reporting incidents, response to common emergencies such as fires, explosions, chemical spills, chemical exposures, injuries.

Serendipity **[3 Hours]**

The role of Chance in making Scientific Discoveries What is Serendipity-Some Serendipitous Inventions in Science; Guncotton, Velcro, Plastic, X-rays, Microwave, Superglue, Mauve, Teflon, Saccharin, Stainless steel, Matches. Role of Serendipity in Drug discovery; Inventions in Chemistry that enabled the modern world.

Laboratory Reagents **[5 Hours]**

Preparation of laboratory reagents and maintenance of electrodes & common laboratory equipments. Methods of expressing concentrations of solution, Preparation of reagents for qualitative analysis of organic and inorganic compounds. Precaution and safety measures during reagent preparation. Numerical problems related to preparation of solutions.

UNIT-II

Domestic Chemicals **[12 Hours]**

Cleansing Agents: Chemical composition of soaps, detergents, dish washers, cdrain cleaners, bleaching powder, tooth paste, mouth wash, Stain removers, shampoo and stain removers-Explanation with some common examples. Preparation of soaps, detergents and bleaching powder.
Domestic Items: Safety matches, Wax candles, shoe polish, mosquito coils, household germicides and pesticides-their chemical composition. Candle preparation.

Cosmetics: Talcum powder, nail polish, thinners, skin care, hair care, lipsticks, sun protection lotions and creams, eye shadow and eyebrow pencils, antiperspirants, perfumes, antiperspirants and deodorants-explanation with examples. Preparation of perfumes.

Reference Books

1. Chemistry at Home: Exploring the ingredients in everyday products by John Emsley, 2015, Royal Society of Chemistry
2. Chemistry in daily life by Kripal Singh, Third Edition, Eastern Academy Education, 2012, PHI Learning Pvt. Ltd., New Delhi.
3. Chemistry in everyday life by Shardendu Kislaya, 2011, Discovery Publishing House Pvt. Ltd.
4. Laboratory Safety, theory and Practice, First Edition, Editors: Anthony Fuscaldo and others, 1980, Elsevier Publications.
5. Chemical Laboratory Safety and Security: A Guide to Developing Standard Operating Procedures, 2016, National Academies Press-Board on Chemical Sciences and Technology, Division on Earth and Life Studies.
6. Chemistry Laboratory Safety Manual, Indian Institute of Science Education and Research, 2018, IISER Tirupati.
7. Laboratory Safety Manual, NCBS, 2016, C-CAMP.
8. Practical Chemistry by O. P. Pandey, D. N. Bajpai, S. Giri, 2011, S. Chand and Co.
9. Vogel's Qualitative Inorganic Analysis by G. Svehla, 1979, Longman.
10. Text book of Physical Chemistry by B . R . Puri, L. R. Sharma and M. S. Pathania, 2012, Vishal Publishing Co.
11. Science and serendipity: Famous accidental discoveries, Samira Shackle, Thursday, 2nd April 2015, New Humanist.
12. The role of serendipity in drug discovery by Thomas A. Ban, Dialogues in Clinical Neuroscience, 2006, 8(3), 335–344.
13. Five Chemistry Inventions that changed the modern world-The Conversation, June 2, 2015.
14. Serendipity, Luck and Wisdom in Research by Patrick J. Hannan, 2006, iUniverse Inc.

Fourth Semester B.Sc.

BSCCHCS401: Chemistry Theory-IV

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following basic aspects of chemistry:

1. Nomenclature, isomerism, theory of coordination compounds and metal ligand bonding.
2. Relationship between colligative properties and molecular weight of solutes.
3. Chemical equilibrium, effect of pressure, temperature and concentration on chemical equilibrium.
4. Phase equilibrium and applications of phase diagram.
5. Relationship between physical properties and molecular structure.
6. Refractometry, radiation and nuclear chemistry.
7. Reactive methylene compounds, different reagents used for the synthesis of organic compounds and reactions of carboxylic acids.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. Nomenclature, EAN rule, isomerism, theory of coordination compounds and metal-ligand bonding in transitional metal complexes.
2. Relationship between colligative properties and molecular weight of solutes.
3. Relationship between physical properties and molecular structure.
4. Basic terminology of phase equilibrium and chemical equilibrium.
5. Different reagents used for the synthesis of organic compounds and reactions of carboxylic acids and their derivatives.
6. Refractometry, its applications, radiation and nuclear chemistry.

UNIT-I

Solutions, Dilute Solutions and Colligative Properties [8 Hours]

Methods of expressing concentrations-Activity and Activity coefficients. Colligative properties; Raoult's law of relative lowering of vapour pressure. Osmosis and laws of Osmotic pressure. Elevation in boiling point and depression in freezing point. Thermodynamic derivation of the relation between elevation of boiling point and /depression of freezing point and molecular mass of solute, experimental determination of elevation in boiling point by Walker-Lumsden method and depression in freezing point by Beckmann's method (Illustrative problems to be worked out).

Physical Properties and Molecular Structure [4 Hours]

Optical activity, polarization (Clausius-Mosotti equation), orientation of dipoles in an electric field, dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, magnetic properties-para-magnetism and diamagnetism.

Refractometry [2 Hours]

Introduction-Abbe's Refractometer, applications of Refractometry.

UNIT-II

Coordination Compounds [5 Hours]

Introduction, EAN, Nomenclature, illustration with examples including geometrical and optical isomers, bridging ligands. Isomerism in coordination compounds - ionization isomerism, hydrate isomerism, coordinate isomerism, linkage isomerism. Geometrical isomerism and optical isomerism (coordination numbers 4 and 6).

Metal-Ligand Bonding in Transitional Metal Complexes [9 Hours]

Postulates of Valence Bond Theory (VBT), Examples for sp^3 , dsp^2 , dsp^3, d^2sp^3 and sp^3d^2 hybridization-$[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[Cu(NH_3)_4]^{2+}$, $[Fe(CO)_5]$, $[Fe(CN)_6]^{3-}$, $[Co(NH_3)_6]^{3+}$and $[CoF_6]^{3-}$. Explanation for magnetic properties. Limitations of Valence bond theory.

Crystal Field Theory: Iimportant concepts of CFT, Crystal field splitting in octahedral, tetrahedral and square planar complexes, Jahn-Teller distortion and crystal field stabilization energy. Calculation of CFSE, weak and strong field ligands, spectrochemical series, explanation for stability, geometry, magnetic and spectral properties. Factors affecting the crystal field splitting. Limitations of CFT.

UNIT-III

Reactive Methylene Compounds **[2 Hours]**

Keto-enol tautomerism in ethyl acetoacetate and diethyl malonate, Reactions supporting keto and enol forms. Synthetic applications of reactive methylene compounds: Synthesis of alkyl acetic acids, succinic acids, keto acids, α,β-unsaturated acids (Crotonic acid) and 4-methyl uracil.

Reagents and their Synthetic Utility **[8 Hours]**

Different reagents used for the synthesis of organic compounds with reaction mechanism: i) $KMnO_4$-Oxidation of alkenes to vicinal diols, ii) OsO_4-Synthesis of cis-1,2-diols, iii) Peracids-Baeyer-Villiger oxidation, iv) $LiAlH_4$-Reduction of carbonyl compounds into alcohols, v) N-Bromosuccinimide-Allylic bromination of alkenes, vi) H_2O_2-Dakin reaction, vii) NH_2-NH_2-Wolf-Kishner reduction, viii) Zn-Hg/HCl-Clemmenson reduction, ix) CrO_2Cl_2-Étard reaction. **Explanation with an example for commonly used synthetic reagents:** O_3-Ozonolysis, Periodic acid-Oxidation cleavage of vicinal diols into carbonyl compounds, Lead tetraacetate-Oxidative cleavage of vicinal diamines, $NaBH_4$-Reduction of carbonyl compounds into alcohols, Na/ethyl alcohol-Reduction of ester to alcohol by Bouveault-Blanc reduction.

Structure and Reactions of Carboxylic Acids and their Derivatives **[4 Hours]**

Structure of carboxylic acid and carboxylate ion, Effect of substituents on the acidity of aliphatic and aromatic carboxylic acids (ortho effect). Reactions of carboxylic acids with mechanism: i) Homologation-Arndt-Eistert reaction, ii) Degradation to alkyl halides-Hunsdiecker reaction, iii) Conversion to primary amines-Curtius reaction, iv) Conversion to haloacids-HVZ reaction. Preparation of derivatives of carboxylic acids-Acid chlorides, amides, esters. Reactions of acid derivatives: Conversion of acid chlorides into aldehydes-Rosenmund's reduction.

UNIT-IV

Chemical Equilibrium **[4 Hours]**

Derivation of relationship between equilibrium constant and free energy $\Delta G=-RTInK_p$. Thermodynamic derivation of law of mass action. LeChatelier's principle-Statement and applications-Habers process for the synthesis of ammonia. Van't Hoff's reaction Isotherm and reaction isochore (Van't Hoff equation). (Illustrative problems to be worked out).

Phase Equilibrium **[7 Hours]**

Phase Rule: Statement (mathematical expression) and meaning of the terms. Explanation for the terms phase, component and degrees of freedom with suitable examples for each. Derivation of phase rule from thermodynamic consideration. Explanation of phase equilibrium of one component system (Water and Sulphur system) using phase diagram. Two component system: Classification with examples. Simple eutectic system (lead-silver system)-Phase diagram and explanation, desilverisation of lead (Pattinson's Process). Solid solutions: Compound formation with congruent melting point (Mg-Zn system)-Phase diagram and explanation. Compound formation with incongruent melting point (NaCl + water system)-Phase diagram and explanation. Freezing mixtures (acetone-dry ice).

Radiation and Nuclear Chemistry **[3 Hours]**

Radiolysis of water (using gamma rays), radiation dosimetry, dosimeters, applications inorganic and organic reactions. Application of radioisotopes in the study of Friedel-Craft's reaction, medicine and soil fertility. Industrial applications.

BSCCHPS402: Chemistry Practicals-IV

[Total number of Practical Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

To understand the practical knowledge and skills for the determination of physical properties of organic compounds.

Course Outcomes

After the completion of the course, the student will develop the practical knowledge and skills for the determination of physical properties of organic compounds.

Determination/Study of the following **(Minimum of any 10 experiments to be carried out)**

1. Specific reaction rate for the acid catalyzed hydrolysis of methyl acetate at room temperature using 0.5N HCl or 0.5N H_2SO_4 .
2. Effect of acid strength on the hydrolysis of an ester.
3. Comparison of the catalytic strengths of HCl and H_2SO_4 by studying the kinetics of hydrolysis of methyl acetate.

4. Rate of decomposition of potassium iodide by hydrogen peroxide.
5. The distribution of iodine between water and carbon tetrachloride.
6. The distribution of benzoic acid between benzene and water.
7. Preparation of arsenious sulphide sol and comparison of the precipitating powers of mono-, di- and tri-valent ions.
8. Density and viscosity of the given liquid (using specific gravity bottle and viscometer).
9. Percentage composition of a given mixture of glycerol and water by viscometry.
10. Density and surface tension of a liquid using stalagmometer.
11. Composition of binary liquid mixture (Alcohol & toluene) by Refractometry.
12. Percentage of NaCl present in phenol-water system.
13. Molecular weight of a non-volatile solute by Walker - Lumsden method.
14. Critical solution temperature of Phenol-water system.

Reference Books

1. Selected Topics in inorganic Chemistry by Madan, Malik, Tuli, 2000, S. Chand and Company.
2. A Text Book of inorganic Chemistry by A. K. De, 2001, New Age international.
3. Engineering Chemistry by B.K. Sharma, 2001, Krishna Publication.
4. A Text Book of Quantitative analysis by A. l. Vogel, 1989, Longman.
5. A Text Book of Inorganic Chemistry by P. L. Soni, 1998, Sultan Chand and Sons.
6. A Text Book of Inorganic Chemistry by Puri and Sharma, 2000, Shobanlal Nagin Chand.
7. A Text Book of Inorganic Chemistry by Gurudeep Raj, 2008, Goel.
8. A Text Book of inorganic Chemistry by Sathya Prakash, 2001, S Chand & Company.
9. Organic Chemistry by P. Y. Bruise, 2000, Pearson Education.
10. Physical Chemistry by Madan and Tuli, 2001, S. Chand & Company.
11. A Text Book of Advanced Physical Chemistry by Gurudeep Raj, 2001, Goel.
12. A Text Book of Physical Chemistry by B.D. Khosla, 2000, S. Chand & Company.
13. Organic Reaction Mechanism by V. K. AhIuwalia and R. K. Parashar, 2010, Narosa.
14. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor, 2012, New Age.
15. Concise Co-ordination Chemistry by R. Gopalan and V. Ramalingam, 2008, Vikas.

Discipline Elective (optional)

BSCCHES403: Chemistry in Everyday Life

[Total number of Lecture Hours: 2 Hours/Week (2x14=28 Hours)]

Course Learning Objectives

By the end of these topics, students will be able to:

1) Understand the composition and nutritional role of food components.
2) Describe food processing and preservation methods.
3) Analyze food adulteration and its health impacts.
4) Evaluate the use of artificial food colorants and chemical contaminants.
5) Recognize the need for renewable energy sources.
6) Understand the scientific principles of renewable energy systems.
7) Identify and explain the applications of alternative energy technologies.
8) Evaluate the benefits and future trends of renewable energy utilization.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1) Understand the composition and functional role of food components.
2) Apply knowledge of food processing, preservation, and additives.
3) Evaluate food safety issues and health impacts.
4) Demonstrate awareness of food laws and safe practices.
5) Understand the need for renewable energy sources.
6) Explain the scientific principles behind various renewable energies.
7) Analyze the working mechanisms and applications of renewable technologies.

UNIT-I

Food Chemistry **[6 Hours]**

Food as source of energy and structural material. Components of food Carbohydrates, Proteins, Oils and Fats. Micronutrients-Vitamins, minerals. Chemical substances used in food preparation - water, common salt, baking powder, vinegar. Food Processing. Food additives, preservatives and flavours. Explanation with examples for the preservation of food by the use of inhibitors, drying, salting, canning, pickling, smoking, packing and refrigeration. Food safety. Soft drinks-Components. Effects on health.

Food Adulteration **[4 Hours]**

Definition, common harmful effects, detection of adulteration, Prevention, Food adulteration act, artificial ripening of fruits – Explanation with examples.

Artificial food colorants **[4 Hours]**

Coal tar dyes and non-permitted colours and metallic salts. Analysis of pesticide residues in food.

UNIT-II

Chemistry for our future **[14 Hours]**

Alternative Sources of Energy: Need for the search of renewable sources of energy.

Solar Energy: Basic properties of solar energy. Applications of solar energy. Transformation of solar energy. Solar heat collectors. Solar photovoltaic collectors. Applications of solar collectors. Examples. Solar power plant.

Wind Energy: Basic properties of wind energy. Applications of wind energy. Transformation of wind energy. Wind turbines. Operative characteristics of wind turbines. Wind power plant. Utilization of wind power. Examples. Trends in wind energy utilization.

Hydro Power: Basic properties water energy. Transformation of water energy. Hydro power plant. Utilization of hydro power. Examples. Trends in hydro power utilization.

Hydrogen Energy: Production and applications.

Ocean Energy: Principles of ocean thermal energy, conversion system. Principles of wave and tidal energy conversion. Transformation of biomass energy. Applications of biomass.

Reference Books

1. Food: The chemistry of its components by Tom Coultate, 2002, The Royal Society of Chemistry.
2. Food Science and Technology by Geoffrey Campbelt-Platt, 2017, Wiley Blackwell.
3. Food chemistry by H. K. Chopra and P. S. Panesar, 2010, Narosa Publishing.
4. Chemistry at Home: Exploring the ingredients in everyday products by John Emsley, 2015, Royal Society of Chemistry.
5. Chemistry in daily life by Kirpal Singh, 2012, Eastern Academy Education, PHI Learning Pvt. Ltd, New Delhi.
6. Chemistry in everyday life by Shardendu Kislaya, 2011, Discovery Publishing House Pvt. Ltd.

7. Renewable energy sources and emerging technologies by D. P. Kothari, K. C. Singal and Rakesh Ranjan, 2016, PHI Learning Pvt. Ltd, New Delhi.
8. Solar energy: Fundamentals and applications by H. P. Garg and J. Prakash, 2000, McGraw Hill.
9. Biomass regenerable energy by D. O. Hall and R. P. Overend, 1987, Wiley-Blackwel.
10. Introduction to wind turbine aerodynamics by Alois Peter Schaffarczyk, 2014, Springler.
11. Hydrogen and fuel cells: Fundamentals, technologies and applications by Detlef Stolten, 2010, Wiley-Vest.

Compulsory Skill/Practical Paper

(May be offered in either IV, V or VI Semester)

BSCCHSS404/504/604: Internship/Mini Project Work

[Total number of Project Work Hours: 2 Hours/Week (2x14=28 Hours)]

Internship/Mini project has to be compulsorily carried out in one of the last three semesters (Semester IV or V or VI) with a workload of 2 hours per week under the supervision of a teacher. Report on the internship/Mini project has to be submitted for evaluation.

Fifth Semester B.Sc.

BSCCHCS501: Chemistry Theory-V

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following aspects of chemistry:

1. Applications of complexes and complex formation in metallurgy, qualitative and gravimetric analysis.
2. Knowledge about magnetic properties, electronic spectra, thermodynamic and kinetic aspects of metal complexes.
3. Types conductance of electrolytes and their measurements.
4. The basic concepts of photochemistry and supramolecular chemistry.
5. Basic principles and applications of rotational and vibrational spectroscopy in structural analysis.
6. Basic knowledge of stereochemistry of organic compounds and organic compounds of nitrogen.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. The basic principles of rotational spectroscopy and its applications.
2. Types conductance of electrolytes, their measurements and Kohlrausch law.
3. Understand the basic concepts of photochemistry and photochemical reactions.
4. The basic concepts supramolecular chemistry.
5. Spectral data in the determination of structure of organic compounds.
6. The knowledge of magnetic properties, electronic spectra, thermodynamic and kinetic aspects of metal complexes.
7. The fundamentals of stereochemical aspects of organic compounds and organic compounds of nitrogen.

UNIT–I

Electrochemistry-I **[7 Hours]**

Strong and Weak electrolytes, Specific conductance, Equivalent conductance and its determination – its variation on dilution, Debye-Huckel theory, Debye-Huckel-Onsager's equation for strong electrolytes (no derivation). Transport number, definition, Hittorf's rule, determination of transport number by Hittorf's method using attackable and unattackable electrodes and moving boundary method. Kohlrausch's law and its applications & related problems.

Photochemistry **[7 Hours]**

Interaction of radiation with matter, difference between thermal and photochemical processes. Primary and secondary processes of a photochemical reaction, Laws of photochemistry: Grotthuss - Draper law, Stark - Einstein law (only statement), Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, radiative and non-radiative processes (internal conversion, inter system crossing). Quantum yield-definition, reasons for low and high quantum yield & related problems. Explanation for low and high quantum yield reactions taking combination of H_2 and Br_2 and combination of H_2 and Cl_2 as examples. Photosensitized reactions-energy transfer processes, definition of photosensitization. (e.g.: Photosynthesis in plants, dissociation of H_2, Isomerization of 2-butene and butadiene), photoinhibition.

UNIT-II

Application of Metal Complexes and Complexation **[3 Hours]**

Applications of Complexes and Complex Formation in Metallurgy: Ag, Au, Al, Ni extractions, Volumetric analysis: Complexometry, masking, demasking techniques with example, Qualitative Analysis: Test for ferrous and ferric ions, nitrate and ammonium ions, Gravimetric Analysis: Precipitation of nickel, magnesium and aluminum ions.

Thermodynamic and Kinetic aspects of Metal Complexes **[3 Hours]**

A brief outline of thermodynamic stability of metal complexes. Stepwise formation and overall formation constants and factors affecting the stability of complexes. Substitution reactions of square planar complexes, Trans effect, theories and applications of Trans effect.

Magnetic Properties of Transition Metal Complexes **[6 Hours]**

Origin of Magnetism, terms used in Magnetochemistry: Magnetic induction, Magnetic flux density, Magnetic moment and Magnetic susceptibility, Magnetic permeability. Lande's calculation of theoretical magnetic moment. μS+L, comparison of magnetic moment μs and μs+L with experimental value of μ. Magnetic behavior of substances-Types of magnetic behavior, Methods of determining magnetic susceptibility-Gouy's method. Temperature dependence of magnetic properties, Curie temperature, Neel temperature, Application of magnetic moment data of 3d-metalcomplexes.

Supramolecular Chemistry **[2 Hours]**

Introduction, Definition, basics of supra molecular chemistry, classification of supramolecules, host and guest compounds, driving forces for the formation of supramolecular structures, Applications.

UNIT-III

Organic Compounds of Nitrogen **[4 Hours]**

Nitroarenes: Reduction in acidic, neutral and alkaline media. Mechanism of nucleophilic substitution in nitroarenes. Amines: Separation of mixture of primary, secondary and tertiary amines (Hinsberg and Hofmann's method).

Stereochemistry of Organic Compounds **[10 Hours]**

Configurational isomerism-optical, geometrical and conformational. Differences between configuration and conformation.

Optical Isomerism: Elements of symmetry, molecular chirality, stereogenic centre, chiral and achiral molecules with two stereogenic centres-Lactic acid and Tartaric acid. Enantiomers-properties, resolution of enantiomers. Diastereomers-definition & examples, threo and erythro diastereomers, meso compounds-definition and examples. Inversion (of sugars) and racemization. Relative and absolute configuration, sequence rules, D & L, R & S systems of nomenclature.

Geometric Isomerism: Determination of configuration of geometric isomers. E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism-conformational analysis of ethane and 1,2-dichloroethane. Conformations of cyclohexane-Newman projection.

UNIT-IV

Rotational Spectroscopy **[6 Hours]**

Derivation of equation for moment of inertia of diatomic molecule, Diatomic molecule as rigid rotor; derivation of equation for moment of Inertia of diatomic molecule, energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotor, isotope effect and related problems.

Vibrational Spectroscopy **[8 Hours]**

Molecular vibrations, vibrational degrees of freedom, Hooke's law. Energy levels of a simple harmonic oscillator, selection rules, Instrumentation and measurement of IR spectrum intensity and position of IR bands, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion, Fingerprint region and functional group region. Characteristic absorptions of various functional groups and interpretation IR spectra of simple organic compounds and related problems.

BSCCHST302: Chemistry Theory-VI

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following aspects of chemistry:

1. The basic principle and applications of Raman spectroscopy.
2. Fundamental's quantum mechanics.
3. Elementary idea of flame photometry and thermo analytical methods.
4. Basic principle of electronic spectra of transition metal complexes.
5. Basic aspects of preparation and properties of heterocyclic and organometallic compounds.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. Theories of Raman Effect and vibrational Raman spectra.
2. Quantum theory, quantum numbers and postulates of quantum mechanics.

3. Principle, instrumentation and applications of flame photometry and thermoanalytical methods.
4. Knowledge on electronic spectra of transition metal complexes.
5. Basic aspects of preparation and properties of heterocyclic and organometallic compounds.
6. Importance of essential and trace elements in biological processes.

UNIT-I

Elementary Quantum Mechanics **[11 Hours]**

Black-body radiation, Plank's radiation law, photoelectric effect, Compton effect. De-Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, particle in a one-dimensional box. Setting up of Schrodinger wave equation for H-atom (no separation of variables or solution), quantum numbers and their importance.

Raman Spectroscopy **[3 Hours]**

Classical and Quantum theory of Raman effect. Concept of polarizability. Rotational and Vibrational Raman Spectra. Selection Rules.

UNIT-II

Electronic Spectra of Transition Metal Complexes **[7 Hours]**

Introduction, Russel-Saunder's coupling, microstates, Spectroscopic ground state for d^n system, Term symbols generated by ligands, Types of electronic spectra, Selection rules for d-d transitions, Relaxation of selection rules, Spectrochemical series. Orgel-energy level diagram for d^1 and d^9 systems, discussion of the electronic spectra of $[Ti(H_2O)_6]^{3+}$ and $[Cu(H_2O)_6]^{+2}$ complex ions.

Organometallic Compounds **[7 Hours]**

Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li and Hg, mononuclear carbonyls and the nature of bonding in metal carbonyls, evidences in support of back bonding, Industrial applications of organometallic compounds-Hydrogenation of alkenes-Wilkinson's catalyst, Fischer-Tropsch synthesis.

UNIT-III

Heterocyclic Chemistry **[11 Hours]**

Classification and nomenclature, Molecular orbital pictures and explanation for the aromatic characteristics of pyrrole, furan, pyridine, pyrazole, oxazole and thiazole. Comparison of aromaticity of pyrrole, furan and pyridine. General methods (any two) of synthesis and reactions of pyrrole, furan, pyridine, pyrazole, oxazole and thiazole, mechanism of electrophilic substitution in furan and pyrrole. Mechanism of electrophilic and nucleophilic substitution in pyridine, comparison of basicity of pyridine, piperidine and pyrrole, condensed five and six membered heterocycles-explanation with examples. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer- Indole synthesis, Skraup quinolone synthesis and Bischler-Napieralski Isoquinoline synthesis, Mechanism of electrophilic substitution reactions of indole and quinoline.

Nucleic Acids **[3 Hours]**

Components of Nucleic acids-Adenine, guanine, thymine and Cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature), Structure of polynucleotides; Structure of DNA (Watson-Crick Model) and RNA (types of RNA),

UNIT-IV

Flame Photometry **[2 Hours]**

General principles, Instrumentation, Interference and applications.

Thermo Analytical Methods: **[3 Hours]**

Principles and applications (TG, DTA & DTG).

Bioinorganic Chemistry **[4 Hours]**

Essential and trace elements in biological processes, biological role of metals-Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Fe^{2+}, Cu^{2+}, Zn^{2+}. Effect of excess intake of metals, metallo porphyrins with reference to hemoglobin and myoglobin. Chlorophyll.

Symmetry and Point Groups **[5 Hours]**

Symmetry elements and associated symmetry operations. Types of symmetry elements-axis of symmetry, plane of symmetry, centre of symmetry, identity, rotation reflection axes. Classification of molecules based on symmetry elements-Schoenflies notation, taking the examples of H_2O, NH_3, BF_3, trans N_2F_2 and HCl.

BSCCHPS503: Chemistry Practicals-V

Gravimetric analysis and Physical Chemistry Experiments

[Total number of Practical Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

Apply and practice skills of gravimetric estimations, solvent extraction, steam distillation effluent analysis, stereochemical study of organic compounds etc.

Course Outcomes

After the completion of the course, the student will develop the practical knowledge and skills for the gravimetric estimations, solvent extraction, steam distillation, effluent analysis, stereochemical study of organic compounds etc.

Minimum of any 10 experiments to be carried out

Inorganic Gravimetric Exercises

1. Estimation of barium as barium sulphate in barium chloride solution.
2. Estimation of copper as cuprous thiocyanate in copper sulphate solution.
3. Estimation of Ni as Nickel dimethyl glyoximate in nickel ammonium sulphate solution.
4. Estimation of iron as ferric oxide in ferrous ammonium sulphate solution.
5. Gravimetric estimation of chloride / silver as AgCl in NaCl/$AgNO_3$ solution.
6. Estimation of magnesium as oxinate in magnesium sulphate solution.
7. Solvent extraction: Separation and estimation of Mg (II) and Fe (II) ion.
8. Colorimetry:
   a. Verification of Beer-Lambert Law by Job's method
   b. Verification of Beer-Lambert Law by Mole ratio method.
9. Adulteration: Determination of adulteration in food stuffs.
10. Effluent analysis: Analysis of effluent water.
11. Steam Distillation:
    a. Steam distillation of Naphthalene from its suspension in water.
    b. Steam distillation of Clove oil from cloves.
    c. Separation of o-and p-nitrophenols by steam distillation.

Stereochemical Study of Organic Compounds *via* Models

12. R and S configuration of optical isomers.

13. E and Z configuration of geometrical isomers
14. Conformational analysis of cyclohexane and substituted cyclohexane.

Reference Books

1. Basic concepts of Analytical Chemistry by S. M. Khopkar, 1993, New Age International.
2. Instrumental methods of Chemical Analysis by B. K. Sharma, 1999, Goel.
3. Instrumental methods of Chemical analysis by Gurudeep R. Chatwal and Sham Anand, I998, Himalaya.
4. Instrumental methods of Chemical analysis by Willard, Merritt, Dean and Skettle, 2004, CBS.
5. A Text Book of Inorganic Chemistry by Gurudeep Raj, 2008, Goel.
6. A Text Book of inorganic Chemistry by Sathya Prakash, 2001, S. Chand & Company.
7. Concise Inorganic Chemistry by J. D. Lee, l998, Blackwell Science.
8. Principles of Inorganic Chemistry by Puri, Sharma and Kalia, 2000, Shobanlal Nagin Chand.
9. Selected Topics in Inorganic Chemistry by Madan, Malik, Tuli, 2000, S. Chand & Company.
10. A Text Book of Inorganic Chemistry by A. K. De, 2001, New Age International.
11. A Text Book of Quantitative Analysis by A. I. Vogel, 1989, Longman.
12. Inorganic Polymers by G. R. Chatwal, l993, Himalaya Publishing House.
13. Theoretical Principles of Inorganic Chemistry by Manku, 2001, Tata McGraw Hills.
14. A Text Book of Inorganic Chemistry by Cotton and Wilkinson, 1992, Wiley lnterscience.
15. A Text Book of Inorganic Chemistry by Emeleus and Anderson, l992, New Age international.
16. Organic Chemistry by P. Y. Bruise, 2000, Pearson Education.
17. Agricultural Chemistry by B. A. Yagodin, 1976, Mir Publishers (Moscow).
18. Physical Chemistry by Madan and Tuli, 2001, S. Chand & Company.
19. A Text Book of Advanced Physical Chemistry by Gurudeep Raj, 2001, Goel.
20. A Text Book of Physical Chemistry by B. D. Khosla, 2000, S. Chand & Company.
21. Fundamentals of Molecular Spectroscopy by C. Banwell and E. M. McCash, 1982, Himalaya.
22. Physical Chemistry by Colin N. Banwell, l998, Himalaya Publishing.
23. Physical Chemistry by Glasstone, 1982, ELBS.
24. A Text Book of Physical Chemistry by P. L. Soni, O. P. Dharmarha and U. N. Dash, 2011, Sultan Chand and Sons.
25. Organic Spectroscopy by William Kemp, 1991, ELBS.

26. Elementary Organic Spectroscopy by Y. R. Sharma, 2013, S. Chand & Company.
27. Systematic Experiments in Chemistry by Arun Sethi, 2008, New Age Interntionl.
28. Organic Spectroscopy by S. K. Dewan, 2020, CBS.
29. Organic Reaction Mechanism by V. K. AhIuwalia and R. K. Parashar, 2010, Narosa.
30. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor, 2012, New Age International.
31. Introduction to Supramolecular Chemistry by Asim K. Das and Mahua Das, 2019, CBS.
32. Bioorganic, Bioinorganic and Supramolecular Chemistry by P. S. Kalsi, J. P. Kalsi and Ashu Chaudhary, 2007, New Age Internationl.
33. Advanced Physical Chemistry by Gurudeep Raj, 2011, Krishna Prakashan.
34. Bio-Inorganic Chemistry by K. Hussain Reddy, 2007, New Age Internationa.
35. Group Theory and Symmetry in Chemistry by Gurudeep Raj, Ajay Bhagi and Vinod Jain, 2017, Krisna Prakashana.
36. Chemical Applications of Group Theory by F. A. Cotton, 1990, Wiley.
37. Advanced Inorganic Chemistry-Vol II by S. P. Banerjee, 2015, Books & Allied.
38. Group Theory and its Applications in Chemistry-Second edition by Salahuddeen Kunju and G. Krishnan, 2015, PHI Learning.
39. Essentials of Nuclear Chemistry by H. J. Arnikar, 2016, Wiley Eastern.
40. Organometallic Chemistry by R. C. Mehrotra and A. Singh, 2000, New age International.
41. Heterocyclic Chemistry by Raj K. Bansal, 2020, New Age International,
42. Medicinal Chemistry by G.R. Chatwal, 2010, Himalaya.

Compulsory Skill/Practical Paper

(May be offered in either IV, V or VI Semester)

BSCCHSS404/504/604: Internship/Mini Project Work

[Total number of Project Work Hours: 2 Hours/Week (2x14=28 Hours)]

Internship/Mini project has to be compulsorily carried out in one of the last three semesters (Semester IV or V or VI) with a workload of 2 hours per week under the supervision of a teacher. Report on the internship/Mini project has to be submitted for evaluation.

Sixth Semester B.Sc.

BSCCHCS601: Chemistry Theory-VII

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following aspects of chemistry:

1. Polymers, polymerization techniques and applications of polymers.
2. Electrodes, electrochemical cells, fuel cells and applications electrochemical cells.
3. Alkaloids, terpenes, fungicides and herbicides**.**
4. Fundamentals of green chemistry, composites, mass spectra.
5. Basic concept of petroleum and petrochemicals.
6. Biological importance and functions of amino acids, peptides and proteins.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. Types of polymers, polymerization techniques and applications of organic and inorganic polymers.
2. Electrodes, electrochemical cells, fuel cells and applications electrochemical cells.
3. The mechanism of interconversion, ascending and descending of carbohydrates.
4. Biological importance and functions of amino acids, peptides and proteins.
5. Alkaloids, terpenes, Pesticides, fungicides and herbicides**.**
6. Fundamentals of green chemistry, composites, mass spectrum.
7. Basic concept of petroleum and petrochemicals.

UNIT-I

Electrochemistry II **[12 Hours]**

Application of Conductivity Measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt and conductometric titrations. Reference electrodes: Calomel electrode, quinhydrone electrode and Ag/AgCl electrode. EMF of a cell and its measurements. Computation of cell EMF. Relation between ΔG and K for a cell reaction, Concentration cell with and without transport, Liquid Junction potential, Application of concentration cells-Determination of valency of ions and

solubility product, Potentiometric titrations. Determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods and related problems.

Fuel Cells **[2 Hours]**

Importance, Working of Hydrogen-Oxygen fuel cell and Methanol-oxygen fuel cell.

UNIT-II

Organic Polymers **[6 Hours]**

Introduction, general classes of synthetic polymers-Addition and condensation with examples, Types of polymerizations (i) Free radical polymerization (ii) Cationic polymerization and (iii) Anionic polymerization of vinyl polymers with one example each, Zeigler-Natta polymerization. Condensation polymers-Phenol formaldehyde resins- Bakelite, urea-formaldehyde resins, Epoxy resins and polyurethanes-preparation and applications. Natural rubber-composition. Vulcanization, Synthetic rubbers: Buna-S and SBR-preparation and applications, advantages of synthetic rubbers over natural rubbers.

Inorganic Polymers **[4 Hours]**

Preparation, properties, structure and applications of silicones, fluorocarbons and phosphonitrilic halides. Production and structural features of borazine, boron nitride, sulphur nitride (SN)x and silicon carbide.

Conducting and Biodegradable Polymers **[4 Hours]**

Conducting Polymers: Introduction, definition and examples-polyaniline, polyacetylene. Mechanism of conduction. Qualitative treatment of doping, Properties-elasticity with high electrical conductivities, Engineering and biological applications

Biodegradable Polymers: Introduction, Structure and Properties, Mechanism of breakdown, Applications and uses.

UNIT-III

Alkaloids **[4 Hours]**

Classification with examples, General properties formation of salts and exhaustive methylation, physical properties and physiological activity. Structural elucidation of nicotine including synthesis. Structural formulae of atropine, cocaine and hygrine.

Terpenes **[3 Hours]**

Classification with examples, Isolation from plant sources. Structural elucidation of citral including synthesis. Structural formulae of geraniol, o-pinene and camphor.

Pesticides, Fungicides and Herbicides **[4 Hours]**

Introduction to the structure and properties of Pesticides: i) Organochlorine compounds-Heptachlor, BHC; ii) Organophosphorus Compounds-Malathion, Parathion, Endosulphan; iii) Others-Pyrethrin, Aleprin, Baygon. Herbicides: 2,4-dichlorophenoxy acetic acid. Fungicides: Bordeaux mixture, Dithoicarbamate.

Green Chemistry **[3 Hours]**

Green Chemistry for sustainable development and goals. Designing a Green Synthesis, Prevention of Waste bye products, concept of atom economy, Prevention/ minimization of hazardous/ toxic products, reducing toxicity. Green solvents-examples.

UNIT-IV

Mass Spectrometry **[6 Hours]**

Principle and instrumentation of mass spectrometer. Applications in the determination of molecular mass and isotopic abundance. Nitrogen rule, even electron rule, Meclafferty rearrangement. Differentiation between 2-methyl butanal and 3-methylbutanal by Meclafferty rearrangement.

Petroleum and Petrochemicals **[6 Hours]**

Composition of Petroleum, Petroleum refining, Fractional distillation-fractions and their uses. Cracking of Petroleum-Thermal and catalytic. Fixed bed catalytic cracking. Synthetic petrol and its production by Bergius process. Knocking, Octane number and Cetane number. Catalytic and thermal reforming. Important petrochemicals and their applications.

Composites **[2 Hours]**

Introduction, role of matrix in composites, types of matrix, different matrix materials, reinforcement, classification of composites and applications of composites in industry.

BSCCHCS602: Chemistry Theory-VIII

[Total number of Lecture Hours: 4 Hours/Week (4x14=56 Hours)]

Course Learning Objectives

This course helps to understand the following aspects of chemistry:

1. Knowledge about theory and instrumentation of colorimetry and spectrophotometry.
2. About principle and applications of different spectroscopic techniques.
3. Elementary idea of retrosynthesis.
4. Mechanism of interconversion, chain lengthening and shortening of carbohydrates.
5. Structure and functions of amino acids, peptides and proteins.
6. Knowledge about drugs, chemotherauptic agents, lipids and organosulphur compounds.

Course Outcomes

On completion of this course, the student will be able to appreciate the following aspects:

1. Theory and instrumentation of colorimetry and spectrophotometry
2. Principle and applications of different spectroscopic techniques
3. Basic concept of retrosynthesis
4. Mechanism of interconversion, chain lengthening and shortening of carbohydrates
5. Structure and functions of amino acids, peptides and proteins
6. Fundamentals of drugs, lipids and organosulphur compounds

UNIT-I

Colorimetry and Spectrophotometry [4 Hours]

Introduction, theory of colorimetry and spectrophotometry. Beer-Lambert's law, Instrumentation and applications of colorimetry and spectrophotometry.

Ultraviolet (UV) Absorption Spectroscopy [10 Hours]

Absorption Laws, Concept of molar absorptivity, energy level, types of electronic excitations, Frank-Condon principle (explanation about red shift and blue shift), presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypochromic, hyperchromic and hypsochromic shifts. UV spectra of conjugated dienes, dienones and α, β-unsaturated carbonyl compounds. Woodward Fieser's rules (Problems to be discussed).

UNIT-II

Nuclear Magnetic Resonance (NMR) Spectroscopy [11 Hours]

Introduction, NMR active nuclei, principle of NMR spectroscopy, instrumentation of PMR spectrometer, origin of spectra, solvents used, scales, chemical shift, shielding and deshielding, number of signals obtained from the sample, position of signals and factors affecting the chemical shift, spin-spin splitting, spin notation and coupling constants, area of signals, interpretation of PMR spectra of simple organic molecules and its structure such as ethyl bromide, ethanol, 2-propanol, acetaldehyde, acetone, 1,1,2-tribromo ethane, ethyl acetate, aniline, nitrobenzene and benzaldehyde.

Photoelectron Spectroscopy [3 Hours]

Basic principles, valence and core binding energies, shifts in energies due to chemical forces, photoelectron spectra of simple molecules, Koopman's theorem.

UNIT-III

Carbohydrates [7 Hours]

Monosaccharides: Interconversions of glucose and fructose, chain lengthening of aldoses (Kiliani-Fischer method), Chain shortening (Ruff degradation). Conversion of glucose and mannose-epimerisation, Mechanism of osazone formation, Amadori rearrangement, Formation of glycosides, ethers (methyl), esters (acetates). Configuration of glucose and fructose, Determination of ring size of monosaccharides (methylation and periodic acid degradation method), Elucidation of cyclic structure of D(+)-glucose, Mechanism of muta-rotation.

Amino Acids, Proteins and Peptides [5 Hours]

Classification based on functional group, Essential and non-essential amino acids, structure and stereochemistry of amino acids- explanation, Acid-base behaviour, isoelectric point and electrophoresis-explanation. Preparation of α- amino acids from α halogenated acids. Strecker synthesis and Gabriel synthesis. Reactions due to $-CO_2H$ and $-NH_2$ groups, Action of heat on amino acids.

Structure and nomenclature of di-, tri- and polypeptides, classification of proteins based on chemical composition and molecular shape. Peptide structure determination by end group analysis, denaturation of proteins.

Retrosynthesis **[2 Hours]**

Introduction, general terms, synthons and synthetic equivalents, target molecule, general guidelines for disconnection. Retro analysis and synthesis of benzocaine and 4-methoxy acetophenone.

UNIT-IV

Lipids **[5 Hours]**

Introduction, Classification. Fatty acids-definition, classification as saturated and unsaturated with examples and structure (lauric, myristic, palmitic, stearic, oleic, linoleic and linolenic acids). Essential fatty acids-definition with examples Triglycerides-Structure of simple and mixed glycerides. Biological importance of triglycerides. Cholesterol-Types (HDL, LDL and VLDL) Sphingolipids-Structure and biological significance of ceramide.

Drugs and Chemotherapeutic Agents **[2 Hours]**

Classification with examples. Synthesis of antipyrine, Chloramine-T, sulphathiazole and sulphanilamide.

Organo-Sulphur Compounds [**7 Hours]**

Thiols (Mercaptans): Methods of preparation (any two). Reactions-action of sodium, formation of salts, formation of thiol esters and oxidation. Uses of mercaptans.

Thioethers: Methods of preparation (any two). Reactions-Addition of halogens and alkyl halides, Oxidation and hydrolysis. Structure and uses of sulphonal.

Sulphonic acids: Methods of preparation (any two). Reactions of benzene sulphonic acid- i) involving H atom of $-SO_3H$ group ii) involving -OH group of $-SO_2OH$ group iii) involving $-SO_3H$ group iv) involving benzene ring. (One example each).

BSCCHPS603: Chemistry Practicals-VI

Organic Preparations and Instrumental Methods

[Total number of Practical Hours: 4 Hours/Week (4x14 =56 Hours)]

Course Learning Objectives

To understand the practical knowledge and skills for the instrumental experiments, preparation of organic and complex compounds.

Course Outcome

Students should be known how to select a solvent for crystallization, how crystallization should be carried out, complex compound preparation, and conduct experiments using modern instruments.

Minimum of any 10 experiments to be carried out

Organic Preparations

1. Preparation of acetanilide from aniline/benzoylation of aniline.
2. Preparation of p-bromoacetanilide
3. Nitration of acetanilide to p-nitro acetanilide and hydrolysis to p-nitroaniline.
4. Preparation of iodoform from ethanol
5. Preparation of m-dinitrobenzene
6. Preparation of adipic acid from cyclohexanol.
7. Preparation of benzoic acid from toluene/benzaldehyde.
8. Preparation of tribromoaniline from aniline and conversion to tribromobenzene.

Instrumental Methods

9. To determine the strength of the given acid mixture (acetic acid + hydrochloric acid) conductometrically using standard alkali solution.
10. To determine the dissociation constant of a weak acid by potentiometric method.
11. To determine equivalent conductance of sodium chloride by conductometric method.
12. To determine the ionization constant of a weak acid conductometrically.
13. Potentiometric titration of ferrous ammonium sulphate using potassium dichromate as titrant and calculation of the redox potential of Fe^{3+}/Fe^{2+} system on the hydrogen scale.
14. To study the rate of inversion of cane sugar.
15. To determine the concentration of cupric ions, present in a solution using a colorimeter.

Preparation of Complexes

16. Preparation of sodium trisoxalateferrate (III), $Na_3[Fe(C_2O_4)_3]$.
17. Preparation of tetra ammine copper (II) sulphate, $[Cu\ (NH_3)_4]SO_4$.
18. Preparation of hexaaminecobalt (III) chloride, $[Co\ (NH_3)_6]Cl_3$.

Note: Principles of physical chemistry experiments, organic preparation and complex preparation are to be discussed in the laboratory.

Reference Books

1. Instrumental Methods of Chemical Analysis by Gurudeep R. Chatwal and Sham Anand, I998, Himalaya Publishing House.
2. Instrumental Methods of Chemical Analysis by Willard, Merritt, Dean and Skettle, 2004, CBS.
3. A Text Book of Inorganic Chemistry by Cotton and Wilkinson, 1992, Wiley lnterscience.
4. A Text Book of Inorganic Chemistry by P. L. Soni, 1998, Sultan Chand and Sons.
5. A Text Book of Inorganic Chemistry by Puri and Sharma, 2000, Shobanlal Nagin Chand.
6. A Text Book of Inorganic Chemistry by Gurudeep Raj, 2008, Goel.
7. A Text Book of inorganic Chemistry by Sathya Prakash, 2001, S. Chand & Company.
8. Concise inorganic Chemistry by J. D. Lee, l998, Blackwell Science.
9. Principles of Inorganic Chemistry by Puri, Sharma and Kalia, 2000, Shobanlal Nagin Chand.
10. Selected Topics in inorganic Chemistry by Madan, Malik, Tuli, 2000, S. Chand and Company.
11. A Text Book of Inorganic Chemistry by A. K. De, 2001, New Age international.
12. Industrial Chemistry by B. K. Sharma, 2001, Goel.
13. A Text Book of Quantitative Analysis by A. I. Vogel, 1989, Longman.
14. Inorganic Polymers by G. R. Chatwal, l993, Himalaya Publishing House.
15. Theoretical Principles of Inorganic Chemistry by Manku, 2001, Tata McGraw Hills.
16. Advanced Physical Chemistry by Gurudeep Raj, 2011, Krishna Prakashan.
17. Agricultural Chemistry by B. A. Yagodin, 1976, Mir Publishers (Moscow).
18. Physical Chemistry by Madan and Tuli, 2001, S. Chand & Company.
19. A Text Book of Advanced Physical Chemistry by Gurudeep Raj, 2001, Goel.
20. A Text Book of Physical Chemistry by P. L. Soni, O. P. Dharmarha and U. N. Dash, 2011, Sultan Chand and Sons.
21. Organic Spectroscopy by William Kemp, 1991, ELBS.
22. Elementary Organic Spectroscopy by Y. R. Sharma, 2013, S. Chand & Company.
23. Systematic Experiments in Chemistry by Arun Sethi, 2008, New Age Interntionl.
24. Organic spectroscopy by S. K. Dewan, 2020, CBS.
25. Organic Reaction Mechanism by V. K. AhIuwalia and R. K. Parashar, 2010, Narosa.
26. Organic Chemistry by S. M. Mukherji, S. P. Singh and R. K. Kapoor, 2012, New Age International.
27. Green Chemistry by V. K. Ahluwalia, 2006, Ane Books.

28. A Hand Book of Sustainable Polymers by Vijay Kumar Thakur and Manju Kumari Thakur, 2016, CRC Press.
29. Degradable polymers, Principles and Applications by Gerald Scott, 2002, Kluwer Academic.
30. Hand Book of Biopolymers edited by Shakeel Ahmed, Suvardhan Kanchi, Gopalakrishnan Kumar, 2018, CRC Press.

Compulsory Skill/Practical Paper

(May be offered in either IV, V or VI Semester)

BSCCHSS404/504/604: Internship/Mini Project Work

[Total number of Project Work Hours: 2 Hours/Week (2x14=28 Hours)]

Internship/Mini project has to be compulsorily carried out in one of the last three semesters (Semester IV or V or VI) with a workload of 2 hours per week under the supervision of a teacher. Report on the internship/Mini project has to be submitted for evaluation.

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MANGALORE UNIVERSITY

DEPARTMENT OF ENGLISH

SEP SYLLABUS

FOR

UNDERGRADUATE DEGREE PROGRAMMES

(Approved on JULY 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

MANGALORE UNIVERSITY

DEPARTMENT OF ENGLISH

(Approved on JULY 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS
I SEMESTER
ENGLISH LANGUAGE

Course Outcomes

By the end of the programme the students will

- **CO - 01 :** Acquire the LSRW (Listening, Speaking, Reading, Writing) skills
- **CO - 02 :** Learn to appreciate literature
- **CO - 03 :** Obtain the knowledge of literary devices and genres
- **CO - 04 :** Acquire creativity and the skills of expression
- **CO - 05 :** Know how to use digital learning tools
- **CO - 06 :** Be aware of social responsibilities
- **CO - 07 :** Develop the ability to read and write critically
- **CO - 08 :** Increase the reading speed
- **CO - 09 :** Enhance the analytical skills

MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for I Semester BA/ BHRD/BSW/BVA and Other Courses under the Faculty of Arts

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- The Yellow Wallpaper- Charlotte Perkins Gilman
- Tar Comes- Devanoora Mahadeva
- Uncle Podger Hangs a Picture - Jerome K Jerome
- Appro JRD- Sudha Murthy
- "Passive Resistance" Chapter XVII- *Hind Swaraj*- M K Gandhi

Section II - Poetry (13 hours)

- Silence – Anasuya Sengupta
- The Tables Turned – William Wordsworth
- An Irish Airman Foresees his Death– W.B.Yeats
- Night of the Scorpion- Nissim Ezekiel
- On Killing a Tree – Gieve Patel

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Comprehension passage, classification and process analysis
- Referencing Skill, Brochure, Advertisements and Picture reading

- Data Interpretation
- Listening vs. hearing
- Non-verbal and Verbal signs of active listening
- Listening Activities - listening to pre-recorded Interviews and conversations

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Introducing oneself, Introducing others**,** Requests, Offering help, Congratulating, Enquiries and Seeking permission
- Giving instructions to do a task and to use a device, giving directions
- Concord, Question Forms, Question Tags
- Use of Derivatives, Linkers

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for II Semester BA/ BHRD/BSW/BVA and Other Courses under the Faculty of Arts

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- Seemantha- H Nagaveni
- Toba Tek Singh – Saadat Hasan Manto
- With the Photographer- Stephen Leacock
- The World of Village Deities - Chandan Gowda
- My Education- Kashibai Kanitkar

Section II - Poetry (13 hours)

- 'She' – Lakshmi Kannan
- 'A Psalm of Life'- H.W.Longfellow
- The Felling of the Banyan Tree - Dilip Chitre
- Identity Card: Mahmoud Darwish
- My Poem- Indudhara Honnapura

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Read the passage and identify the theme
- Read to improve vocabulary: synonyms, antonyms, prefixes, suffixes and collocations.
- Listening as a primary skill
- Listen and repeat, listen and narrate, listen and analyze a poem

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Reported speech
- Dialogue writing
- Creative writing
- Essay writing
- Writing a speech

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for I Semester B.Com/ B.Com (E-Com)

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- The Paddy Harvest- Mogalli Ganesh
- "Passive Resistance" Chapter XVII- *Hind Swaraj*- M K Gandhi
- The Chair- Ki Rajanarayanan
- Why I Want a Wife – Judy Brady
- The Eyes are Not Here - Ruskin Bond

Section II - Poetry (13 hours)

- Mother - Lankesh (Translation: AK Ramanujan)
- The Sonnet-ballad – Gwendolyn Brooks
- The House of My Childhood - Dilip Chitre
- To the Cuckoo – William Wordsworth
- Tonight I can Write The Saddest Lines– Pablo Neruda

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Skimming and Scanning, travelogue reading
- Academic reading, Reference materials, editorials and Brochures
- Job-Oriented reading – Applications, Emails
- Listening Skills, Active and Passive listening

- Listening to Job Interviews and Conversations
- Comprehensive Listening

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Performance Activity, Role play, Extempore, Group Discussion
- Introducing Oneself, Giving Information, Giving Instructions
- Writing Skills: Phrase, Clause, Sentence
- Paragraph writing, verb forms, tenses, subject- verb agreement, Idioms and Phrases
- Speech Writing

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for II Semester B.Com/ B.Com (E-Com)

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- A Simple Philosophy - Seathl
- Girls - Mrinal Pandey
- Neech - Razia Sajjad Zaheer
- Advice to Youth - Mark Twain
- Kabuliwallah - Rabindranath Tagore

Section II - Poetry (13 hours)

- Let Me Not to the Marriage of True Minds (Sonnet 116) - William Shakespeare
- Once Upon a Time - Gabriel Okara
- Sandals and I - Mudnakudu Chinnaswamy

- The Bluebird - Charles Bukowski
- Mirror - Sylvia Plath

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Caption Writing, Identifying a title for the passage
- Vocabulary Building – Synonyms, Antonyms, Homonyms, Collocations
- Identifying the meaning from Paragraphs
- Listening Skills, Barriers to listening
- Listening Principles
- Comprehensive Listening – Select Passages

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Active /Passive Voice
- Reported Speech
- Dialogue Writing
- News Writing
- Essay Writing

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for I Semester B.SC/B.SC(FND)/BSC(HS)/B.SC(CS)/B.SC (FD)/B.SC(GD)/B.SC(LD)/B.SC(IDD)/B.SC(AVE)/B.SC(C)/B.SC(FT)/B.SC(SH) and other courses under the faculty of Science

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks (Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- Unni Katha – M Mukundan
- "Passive Resistance" Chapter XVII- *Hind Swaraj*- M K Gandhi
- Akku- Vaidehi
- The Open Window – Saki
- Claiming an Education- Adrienne Rich

Section II - Poetry (13 hours)

- When in Disgrace (Sonnet 29) - William Shakespeare
- Being Transgender - Lee Mokobe
- The Mountain and the Squirrel – R. W. Emerson
- Phenomenal Woman – Maya Angelou
- Obituary - A.K. Ramanujan

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Comprehension passage, classification and process analysis
- Referencing Skill, Brochure, Advertisements and Picture reading
- Data Interpretation

- Listening vs. hearing
- Non-verbal and Verbal signs of active listening
- Listening Activities - listening to pre-recorded Interviews and conversations

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Introducing oneself, Introducing others**,** Requests, Offering help, Congratulating, Enquiries and Seeking permission
- Giving instructions to do a task and to use a device, giving directions
- Concord, Question Forms, Question Tags
- Use of Derivatives, Linkers

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for II Semester B.SC/B.SC(FND)/BSC(HS)/B.SC(CS)/B.SC (FD)/B.SC(GD)/B.SC(LD)/B.SC(IDD)/B.SC(AVE)/B.SC(C)/B.SC(FT)/B.SC(SH) and other courses under the faculty of Science

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- The Night the Ghost Got In - James Thurber
- Sacred Groves - Madhav Gadgil and M.D. Subhash Chandran
- The Thakur's Well - Munshi Premchand
- Film Making - Satyajit Ray
- The Refugee – Pearl S Buck

Section II - Poetry (13 hours)

- Unfinished Poem- Eunice De Souza

- Patterns - Amy Lowell
- Hiroshima - S H Vatsyayan-- Agyeya
- My People - Siddalingaiah
- So you Want to be a Writer? - Charles Bukowski

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Reading a passage to give a title
- Reading for vocabulary building –synonyms, antonyms, homophones, homonyms, suffixes, prefixes, collocations, words often confused
- Reading passages on specific fields for vocabulary building
- Barriers for effective listening
- Types of Listening
- Techniques to improve listening skills
- Listening to pre-recorded audios, movies and other listening activities

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Reported Speech
- Dialogue writing
- Summarizing
- Speech Writing
- Essay Writing

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for I Semester B.B.A

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- The Touch – Abburi Chaya Devi
- "Passive Resistance" Chapter XVII- *Hind Swaraj*- M K Gandhi
- The Portrait of a Lady- Khushwant Singh
- My Stupid Suicide Plan – Chetan Bhagat
- The Doctor's Word – R.K.Narayan

Section II - Poetry (13 hours)

- An Introduction - Kamala Das
- 'If' – Rudyard Kipling
- Digging – Sikhamani
- I Know Why the Caged Bird Sings – Maya Angelou
- Telephone Conversation – Wole Soyinka

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Skimming and Scanning, travelogue reading
- Academic Reading, Reference materials, editorials and Brochures
- Job-Oriented reading – Applications, Emails
- Listening Skills, Active and Passive listening
- Listening to Job interviews and Conversations

- Comprehensive Listening

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Performance Activity, Role play, Extempore, Group Discussion
- Introducing Oneself, Giving Information, Giving Instructions
- Writing Skills Sentence, Phrases, Clauses
- Paragraph Writing- verb forms, tenses, subject- verb Agreement, Idioms and phrases
- Speech Writing

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for II Semester B.B.A

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- Dadi- Shivani
- A Wedding Called Mantra Mangalya - Chandan Gowda
- The Fortune Teller – Karel Capek
- 'Indian Women Are Never Taught How to Be Alone and That's a Problem' - Kavitha Rao
- Grief /Lament – Anton Chekhov

Section II - Poetry (13 hours)

- No Men are Foreign – James Kirkup
- Waiting - Jacintha Karketta
- Mother and Sari - Hanumanthiah
- A Worker Reads History- Bertolt Brecht

- We Wear the Mask – Paul Laurence Dunbar

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Reading a passage to give a title
- Reading for vocabulary building –synonyms, antonyms, homophones, homonyms, suffixes, prefixes, collocations, words often confused.
- Barriers for effective listening
- Types of Listening
- Techniques to improve listening skills
- Listening to pre-recorded audios

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Reported Speech
- Dialogue writing
- Summarizing
- Speech Writing
- Essay Writing

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS FOR I SEMESTER B.C.A.

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks (Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (13 hours)

- The Cop and the Anthem - O Henry
- "Passive Resistance" Chapter XVII- *Hind Swaraj*- M K Gandhi
- The Stolen Bacillus - H. G. Wells
- My Greatest Olympic Prize - Jesse Owens
- Neyipayasam - Kamala Das

Section II - Poetry (13 hours)

- Night of the Scorpion - Nissim Ezekiel
- When in Disgrace (Sonnet 29) - William Shakespeare
- I am Not That Woman - Kishwar Naheed
- Telephone Conversation- Wole Soyinka
- Still I Rise – Maya Angelou

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Comprehension passage, classification and process analysis
- Referencing Skill, Brochure, Advertisements and Picture reading
- Data Interpretation
- Listening vs. hearing
- Non-verbal and Verbal signs of active listening

- Listening Activities - listening to pre-recorded Interviews and conversations

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Introducing oneself, Introducing others**,** Requests, Offering help, Congratulating, Enquiries and Seeking permission
- Giving instructions to do a task and to use a device, giving directions
- Concord, Question Forms, Question Tags
- Use of Derivatives, Linkers

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS FOR II SEMESTER B.C.A.

Title of the Course: ENGLISH LANGUAGE

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Workbook+ Listening and Speaking Exercises:**10** marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination:**3** hours	

Section I - Prose (13 hours)

- The World Renowned Nose- Vaikom Muhammad Basheer
- Wooden Cradles- Lalithambika Antharjanam
- Styles of Welcoming Life- Chandan Gowda
- Operation Indian Ocean – Mihir Sen
- Action Will Be Taken – Heinrich Boll. (Translation. Leila Vennewitz)

Section II - Poetry (13 hours)

- A Psalm of Life – H W Longfellow
- Ecology- A K Ramanujan
- Strange Meeting- Wilfred Owen

- Animals – Walt Whitman
- A Blind Child – W H Davies

Section III - Grammar (26 hours)

Unit 1: Receptive Skills: Reading Skills and Listening Skills

- Reading a passage to give a title
- Reading for vocabulary building –synonyms, antonyms, homophones, homonyms, suffixes, prefixes, collocations, words often confused
- Reading passages on specific fields for vocabulary building
- Barriers for effective listening
- Types of Listening
- Techniques to improve listening skills
- Listening to pre-recorded audios, movies and other listening activities

Unit 2: Productive Skills: Speaking Skills and Writing Skills

- Reported Speech
- Dialogue writing
- Summarizing
- Speech Writing
- Essay Writing

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MANGALORE UNIVERSITY

DEPARTMENT OF ENGLISH

Syllabi for Undergraduate Degree Programmes

(Approved on JULY 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS FOR I SEMESTER
ADDITIONAL ENGLISH

Course Outcomes

By the end of the course the students will have:

- **CO - 001 :** An enhanced knowledge of the English language
- **CO - 002 :** Read some of the best poetry and prose in English
- **CO - 003 :** Developed reading and writing skills
- **CO - 004 :** A knowledge of the basics of English grammar
- **CO - 005 :** Increased the vocabulary and become skilled in writing slogans and captions

MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for I Semester Additional English for Arts/Science/Commerce and BusinessAdministration /Computer Application Courses

Title of the Course: ADDITIONAL ENGLISH

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Assignments on grammar and composition: 10 marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (20 hours)

- The Imp and the Crust - Leo Tolstoy
- Sweets for Angels - R.K Narayan
- Great Expectations - Chapter I -Charles Dickens
- On Habits - AG Gardiner
- Window View - Robert Lynd

Section II - Poetry (12 hours)

- When in Disgrace (Sonnet 29) - William Shakespeare
- Childhood - Markus Natten
- Grandfather's Holiday -- Rabindranath Tagore

Section III - Grammar and Composition (20 hours)

- Correction of Errors (Articles, Verbs, Tenses, Prepositions, Voice)
- Language in Content
- Unseen Passage
- Vocabulary Exercises based on the passage
- Slogan Writing and Caption Writing

Course Book: ***SPECTRUM – I***

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MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP Syllabus for II Semester Additional English for Arts/Science/Commerce and BusinessAdministration /Computer Application Courses

Title of the Course: ADDITIONAL ENGLISH

Course Credits: **3**	Hours per Week: **4**	Total Contact Hours: **52**
Internal Assessment: **20** marks **(**Internal Exams: **10** marks; Assignments on grammar and composition: 10 marks)		
End Semester Exam: **80** marks	Duration of End Semester Examination: **3** hours	

Section I - Prose (20 hours)

- The Door -P Lankesh
- The Tell Tale Heart - Edgar Allan Poe
- The Dead Man Who Wore Pyjamas -Paulo Coelho
- On Travel by Train -J.B. Priestley
- The Obligations to Endure - Rachel Carson

Section II - Poetry (12 hours)

- The Human Seasons - John Keats
- If -Rudyard Kipling
- Just Keep Quiet and Nobody Will Notice - Ogden Nash

Section III - Grammar and Composition (20 hours)

- Framing sentences using idioms
- Degrees of comparison
- Hyponym and Super ordinates
- Prefix and Suffix
- Synonyms
- Drafting Brochure
- Drafting Leaflet
- Drafting Invitations

Course Book: ***SPECTRUM – II***

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MANGALORE UNIVERSITY

DEPARTMENT OF ENGLISH

Syllabi for Undergraduate Degree Programmes

(Approved on JULY 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

Programme Outcomes

At the end of the B.A in English programme, the students would:

PO-01: Be able to demonstrate a broad knowledge of major and minor writers, texts and contexts, defining issues of canonical and non-canonical literature

PO-02: Have honed their skills of understanding, applying, analyzing, and evaluating literature

PO-03: Be able to write with clarity, creativity and persuasiveness.

PO-04: Develop and demonstrate an awareness of the significance of literature and literary forms.

PO-05: Be equipped with advanced literary and linguistic skills.

PO-06: Have competency in the use of English from /for a variety of domains.

PO-07: Have a spirit of inquiry and develop critical thinking.

PO-08: Be able to articulate thoughts and generate /understand multiple interpretations of texts

PO-09: Locate and contextualize texts across theoretical orientations and cultural spaces

PO-10: Possess reading and writing skills catering to academic and other professional requirements, viz. print and electronic media, advertising, content writing etc.

PO-11: Imbibe a multi-disciplinary approach in higher education and research

PO-12: Be skilled in multiple domains of knowledge and prepared for multiple careers

PO-13: Become adept in the use of English in the current technological climate

Course Outcomes

At the end of the course on **Reading Literature**, the students would:

CO-01: Be familiar with terms and concepts in Literature

CO-02: Be familiar with the generic construction of texts and the effects they produce in readers.

CO-03: Be able to decipher the ways in which texts orient reader expectations.

CO-04: Become alert to the ways in which texts reaffirm or critique the prevailing historical commonsense of the text as well as the reader.

CO-05: Prepare the student as teachers of language and Literature

MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS FOR I SEMESTER B.A. IN ENGLISH
under the Faculty of Arts
(MAJOR SUBJECT)
Title of the Course: READING LITERATURE

Course Credits: **5**	Hours per Week: **6**	Total Contact Hours: **84**
Internal Assessment: **20** marks **(**(Internal Exams **10** marks + Assignment and Presentation 10 marks)		
End Semester Exam**: 80** marks	Duration of End Semester Examination**: 3** hours	

Section I - Poetry (21 hours)

- **Prologue**

✓ Prologue to the Canterbury tales- (First three stanzas) – Geoffrey Chaucer

- **Sonnet**

✓ Shall I Compare thee? (Sonnet 18) - William Shakespeare

- **Mock Epic**

- ✓ *Rape of the Lock* (Canto I) - Alexander Pope

■ **Epic**

- ✓ *Paradise Lost* (Book I Lines 1-50) - John Milton

■ **Elegy**

- ✓ *Break, Break, Break* – Alfred Tennyson

■ **Ode**

- ✓ *Ode to a Skylark* - P.B. Shelly

■ **Dramatic monologue**

- ✓ *My Last Duchess* - Robert Browning

■ **Personification**

- ✓ *Death, be not Proud* – John Donne

Section II - Drama (21 hours)

■ **Classical Greek Tragedy**

- ✓ *Oedipus Rex* – Sophocles

■ **Elizabethan Tragedy**

- ✓ *Macbeth* - Shakespeare

■ **Farce**

- ✓ *The Importance of Being Earnest*- Oscar Wilde

Section III - Prose (21 hours)

■ **Novel**

- ✓ *Pride and Prejudice* – Chapter I- Jane Austen

■ **Essay**

- ✓ *The Worship of the Wealthy*- G K Chesterton

■ **Short story**

- ✓ *The Purloined Letter*- Edgar Allen Poe

■ **Autobiography**

- ✓ *The Diary of a Young Girl*-Anne Frank (Chapter 1)

Section IV - Literary Concepts and Devices (21 hours)

Poetry

►Simile ►Metaphor ►Personification ►Hyperbole
►Allusion ►Pun ►Onomatopoeia ►Alliteration
►Assonance ► Synecdoche ► Couplet

Drama

►Comedy ► Farce ► Satire ►One-Act Play
►Tragi comedy ► Character ►Plot ►Soliloquy
►Aside ►Irony ► Chorus ►Dialogue
►Protagonist/Antagonist

Prose

► Novella ► Biography ► Plot/Story ► Character
► Narrator- Omniscient narrator/first person narrator

References

- ✓ Abrams, M.H. *A Glossary of Literary Terms*. Australia: Thomson-Wadsworth, 2005.
- ✓ Baldick, Chris. *The Oxford Dictionary of Literary Terms*. OUP, 2001.
- ✓ Bate, Jonathan. *English Literature: A Very Short Introduction.* OUP, 2010.
- ✓ Benett, Andrew. *An Introduction to Literature, Criticism and Theory.* New York : Routledge, 2023.
- ✓ Eagleton, Terry. *What is Literature*. Yale University Press: Padstow Cornwall, 2013.
- ✓ Eaglestone, Robert. *Doing English; A Guide for Literature Students* (4th ed.). London: Routledge, 2018.
- ✓ Elam, Keir. *The Semiotics of Theatre and Drama*. 2nd edn. London: Routledge, 2002.
- ✓ Hudson, William Henry; An *Introduction to the Study of Literature New Delhi Atlantic 2007.*
- ✓ Norton Anthology of Poetry.
- ✓ Ousby, laih. Ed; *The Cambridge Guide to Literature in English,* Cambridge University Press. 1983.
- ✓ Styan, J.L. *The Elements of Drama*. Cambridge: CUP, 1963.
- ✓ Muller, Gilbert H. and John A Williams. *The McGraw-Hill Introduction to Literature.* McGraw-Hill Humanities/Social Sciences/Languages, 1994.

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Course Outcomes

At the end of the course on **Indian Writing in English**, the students would:

CO-01: Be familiar with the history of Indian writing in English and the politics of its colonial origins.

CO-02: Be familiar with Indian English writers, and the spectrum of Indian English writings ranging from the eighteenth century to the present.

CO-03: Learn about the many ways in which, and the many reasons for which, Indians have appropriated a foreign language and made it their own.

CO-04: Have a nuanced understanding of how Indian English writing translated indigenous cultures and life patterns into the English language and the structures of power within which this took place.

CO-05: Be professionally equipped to teach a paper in Indian Writing in English, to become editors in publishing houses and to review the proliferating number of Indian English writings that are being published at present.

MANGALORE UNIVERSITY
DEPARTMENT OF ENGLISH

(Approved on July 12, 2024 BOS (UG), effective for batches commencing from 2024-25 onwards)

SEP SYLLABUS FOR II SEMESTER B.A. IN ENGLISH
under the Faculty of Arts

(MAJOR SUBJECT)
Title of the Course: INDIAN WRITING IN ENGLISH

Course Credits: **5**	Hours per Week: **6**	Total Contact Hours: **84**
Internal Assessment: **20** marks **(**(Internal Exams **10** marks + Assignment and Presentation 10 marks)		
End Semester Exam**: 80** marks	Duration of End Semester Examination**: 3** hours	

Section I - History of Indian English Literature (12 hours)

- The Historical Formation of Indian English Literature- Vinay Dharwadker (Pollock, Sheldon. *Literary Cultures in History*)

OR

- Chapter I- The Literary Landscape: The Nature and Scope of Indian English Literature - M. K. Naik, *A History of Indian English Literature*

Section II -Novel (20 hours)

- *Raj Mohan's Wife* - Bankim Chandra Chatterjee
- *The Shadow Lines*- Amitav Ghosh

Section III - Poems - (20 hours)

- Toru Dutt - Love Came to Flora Asking for a Flower
- Sarojini Naidu - Song of a Dream
- Henry Derozio - To India-My Native Land
- Syed Amanuddin - Don't Call Me Indo-Anglian
- Kamala Das - An Introduction
- A. K. Ramanujan - Small Scale Reflections on a Great House
- Nissim Ezekiel - Good bye Party to Miss Pushpa T S

Section IV - Essays and Short Stories - (20 hours)

- M.K. Gandhi -'The Great Sentinel'
- Swami Vivekananda - 'Chicago Address'
- B.R. Ambedkar - 'A Childhood Journey to Koregaon'
- Begum Rokeya Hossain - Sultana's Dream
- Mulk Raj Anand - The Barber's Trade Union
- Rabindranath Tagore - Kabuliwala

Section V - Drama (12 hours)

- Seven Steps Around the Fire -Mahesh Dattani

References

- ✓ Ansani, Shyam M. *New Dimensions of Indian English Novels*, Delhi: Doaba House,1987.
- ✓ Devy, G.N. *In Another Tongue: Essays on Indian English Literature,* Madras:Macmillan India Ltd. 1995.
- ✓ Gauri Viswanathan. *Masks of Conquest: Literary Study and British Rule in India*. New Delhi: OUP. 1989.
- ✓ Iyenger, K R Srinivasa. *Indian Writing in English*. New Delhi. Sterling Publisher, 1984.

- ✓ Jain, Jasbir. *Beyond Postcolonialism: Dreams and Realities of a Nation*. Jaipur: Rawat Publications, 2006.
- ✓ M. K. Naik (Ed) *The Indian English Short Story: A Representative Anthology*, NewDelhi: Arnold-Heinemann, 1984.
- ✓ Mukherji, Meenakshi. *The Twice Born Fiction*. New Delhi: Heinemann, 1971.
- ✓ Naik, M. K. *A History of Indian English Literature*. Delhi: Sahitya Akademi, 1992.
- ✓ Narasimhiah C D ed *Makers of Indian English Literature,* Delhi Pencraft International. 2000.
- ✓ Pollock, Sheldon.(Ed) *Literary Cultures in History: Reconstructions from South Asia, University of California Press, 2003*
- ✓ Radhakrishnan, N. *Indo Anglian Fiction: Major Trends and Themes*. Madras: Emerald.1984.
- ✓ Rao, Krishna. *The Indo-Anglian Novels and the Changing Tradition*. Mysore: Rao and Raghavan, 1973.

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MANGALORE UNIVERSITY

Mathematics Syllabus for Three Major B. Sc. Programme from the Academic year 2024-25

(Semester Scheme)

Preamble:

The B.Sc. Mathematics course aims to provide students with a comprehensive foundation in mathematical principles, theories, and applications. This program is designed to develop critical thinking, analytical skills, and problem-solving abilities essential for various scientific and technical careers.

The Mathematics syllabus for B.Sc. (Two Major Programme) in use at present was introduced from the academic year 2021-22 as per NEP-2020 structure and guidelines given by the state government in 2021. Based on the directions and guidelines from the Higher Education Council of the Government of Karnataka (GO: ED 166 UNE 2023 Bangalore, Date: 08.05.2024), Mangalore University has issued new guidelines to launch the Three Major B.Sc. degree programme starting from the academic year 2024-25. Consequently, the revised and restructured syllabus for Mathematics as an optional subject in the B.Sc. (Three Major Programme) has been prepared according to the new regulations of the University, by modifying the earlier syllabus, including Lab components and introducing new text and reference books.

The following new syllabus for Mathematics as an optional subject in the B.Sc. (Three Major Programme) at Mangalore University has been framed by the Board of Studies in Mathematics for the UG programme. This syllabus will be implemented starting from the academic year 2024-25.

Aims and objectives of the restructured syllabus

- Equip students with a deep understanding of core mathematical concepts and methodologies.
- Improve the perspective of students on mathematics as per modern requirement and develop a spirit of inquiry and scientific temper in the student.
- Initiate students to enjoy mathematics, pose and solve meaningful problems, to use abstraction to perceive relationships and structure and to understand the basic structure of mathematics.
- Create a student-friendly learning environment by encouraging experimental, problem-solving, and discovery-based approaches to learning mathematics.
- To orient students towards relating mathematics applications and improve retention of mathematical concepts in the student.

- To enable the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters with the help of FOSS tools on a computer.
- Encourage analytical and research-oriented thinking to prepare students for advanced studies and professional careers.
- Provide scope for greater involvement of both the mind and the hand and help the student build interest and confidence in learning the subject.
- Facilitate an interdisciplinary approach by integrating mathematics with other scientific and technical fields.
- Introduce new and relevant textbooks and reference materials to ensure students have access to current knowledge and resources.

Program outcomes:

On successful completion of the program, the student will be able to -

1. Verbally communicate mathematical ideas, write logically sound proof, accurately work with formulae and numerical information.
2. Apply solving techniques of differential equations in Mathematics, Physics, Chemistry and Biology.
3. Understand the actual theories behind solving techniques of problems in Calculus, Algebra and Analysis.
4. Connect theoretical and practical aspects of Mathematics.
5. Solve problems in the post graduate entrance exams with ease.
6. Acquire mathematical skill set to clear various aptitude tests conducted by multi-national companies.

Program specific outcomes:

1. The syllabus imparts various technical skills solving mathematical problems and apply them to other fields.
2. Student will be acquiring knowledge to compete at national and international level.
3. Employability will be improved with the knowledge of Mathematical software's.
4. Domain knowledge will be upgraded with the knowledge of applications.
5. Student will be able to handle the challenges due to upgradation of softwares.

This syllabus has been carefully curated by the Board of Studies in Mathematics, incorporating feedback from academic experts, industry professionals, educational policymakers, and all the stakeholders. It is designed to meet the evolving demands of education and industry, ensuring that graduates are well-prepared to contribute effectively in their chosen fields. The implementation of this syllabus will commence from the academic year 2024-25, marking a significant step towards academic excellence and innovation in the field of mathematics.

COURSE PATTERN AND SCHEME OF EXAMINATION
MAJOR SUBJECT: MATHEMATICS

Particulars	Theory(T)/ Practical(P)	Instruction Hours/ Week	Duration of Exam	Marks			Number of Credits
				IA	Semester End Exam	Total	
Semester - I							
Course-1 : Calculus	T	4	3	20	80	100	3
Course-2: Practical-I	P	4	3	10	40	50	2
Semester - II							
Course-3 : Advanced Calculus and Differential Equations	T	4	3	20	80	100	3
Course-4: Practical-II	P	4	3	10	40	50	2
Semester - III							
Course-5 : Number Theory and Higher Order Differential Equations	T	4	3	20	80	100	3
Course-6 : Practical-III	P	4	3	10	40	50	2
Course-7: Elective-1 (a) Mathematical Logic and Set Theory OR (b) Quantitative Mathematics	T	2	2	10	40	50	2
Semester - IV							
Course-8 : Group Theory, Sequences and Series	T	4	3	20	80	100	3
Course-9 : Practical-IV	P	4	3	10	40	50	2
Course-10 :Elective-2 (a) Basic Combinatorial Theory OR (b) Vedic Mathematics	T	2	2	10	40	50	2
Semester - V							
Course-11 : Ring Theory and Laplace Transforms	T	3	3	20	80	100	3
Course-12 : (a) Vector Calculus OR (b) Graph Theory (c) Total Differential Equations and PDE	T	3	3	20	80	100	3
Course-13 :Numerical Methods with Lab	P	4	3	10	40	50	2
Semester - VI							
Course-14 : Complex Analysis and Linear Algebra	T	3	3	20	80	100	3
Course-15 : (a) Numerical Analysis OR (b) Operations Research	T	3	3	20	80	100	3
Course-16 : Practicals on Complex Analysis and Linear Algebra	P	4	3	10	40	50	2

Note:

1. In the 3rd and 4th semesters, Course-7(a), Course-7(b), Course-12(a) and Course-12(b) are Elective Courses. Any B.Sc. student with Mathematics as one of their major subjects may choose either Course-7(a) or Course-7(b) in the third semester, and one of Course-10(a) or Course-10(b) in the fourth semester.

2. For 5th and 6th semesters, Course-11 and Course-14 respectively are compulsory Courses. In the 5th semester, a student has to choose one of the special Courses either Course-12(a) or

Course-12 (b). In the 6th semester, a student has to choose one of the special Courses from Course-15(a) or Course-15(b).

Syllabus

I Semester

Course 1	Calculus	3 Credits	(56 Hours, 4 hours/week)

Course Objectives:

- To review and strengthen understanding of the fundamental concepts of differentiable functions, including properties of differentiation, and critical points.
- To provide a thorough understanding of key theorems in calculus such as Rolle's Theorem, Mean Value Theorem, and Cauchy's Mean Value Theorem.
- To apply calculus concepts to practical problems, including curve sketching, optimization problems, and evaluating integrals using various techniques.
- To develop proficiency in different integration techniques and their applications, including the use of reduction formulae.
- To introduce and explore the concepts of functions of several variables, including limits, continuity, partial derivatives, and their applications.

Course Outcomes:

- Students will be able to understand and apply properties of differentiation, and solve problems involving local extrema and concavity.
- Students will be able to understand and apply key theorems such as Rolle's Theorem, Mean Value Theorem, and Cauchy's Mean Value Theorem in various contexts.
- Students will develop the ability to solve applied optimization problems, sketch curves, and use asymptotes effectively in analysis.
- Students will be able to evaluate definite and indefinite integrals using techniques such as reduction formulae, partial fractions, etc.
- Students will gain a solid understanding of the behavior of functions of several variables, and get ability to compute and interpret directional derivatives and gradients.
- Students will be able to find and classify extreme values and saddle points for functions of two variables, using second derivative tests and other techniques.

Unit I: **(14 Hours)**

Recapitulation: Definition and Examples of Differentiable functions, Properties of Differentiation, Increasing decreasing functions, critical points, local extrema.
Rolle's Theorem, The mean value theorem. Concavity, Points of inflection, Second derivative test for concavity, Second derivatives test for local extrema, Asymptotes (horizontal, vertical and oblique), Sketching curves $y = f(x)$, Applied Optimization Problems.

Unit II **(14 Hours)**

Indeterminate Forms (all types), L'Hospital's Rules (First form and stronger form), Cauchy's Mean Value Theorem, Taylor's and Maclaurin's series.

Vector Calculus: Directional Derivatives, Gradient of Functions of Two or Three Variables, Properties of Directional Derivatives, Gradients and Tangents to Level Curves, Level Surfaces, Tangent Planes and Normal Lines to Level Surfaces.

Unit III **(14 Hours)**

Integration: Techniques of integration, definite integrals, Mean value theorem for definite integrals, Fundamental theorem of calculus (Part 1 and 2). Derivation of reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \log^n x\,dx$, $\int \sec^n x\,dx$, $\int \sin^n x\,\cos^m x\,dx$, etc. Evaluation of integrals using reduction formulae, Integration of rational functions by partial fractions, trigonometric integrals.

Unit IV **(14 Hours)**

Functions of several variables: Domain, Range, Interior points, Boundary points, Closed, Open, Bounded and unbounded regions in the plane, Level curves and Level surfaces. Limits and Continuity, Two-Path tests for non-existence of limits, Partial derivatives, Implicit partial differentiation, Partial derivatives and continuity, Higher order partial derivatives, Mixed derivative theorem, Differentiability, Chain rule for differentiation. Extreme value and saddle points for the functions of two variables , second derivative test for local extrema.

Text Book

Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008.

References

[1] Lipman Bers *Calculus*, Holt,Rinehart & Winston of Canada Ltd., 1969.

[2] Louis Leithold, *Calculus with Analytic Geometry*, 5th Ed., Harper and Row International, 1986.

[3] George B. Thomas and Ross L. Finney, *Calculus and Analytic Geometry*, Addison-Wesley, 1992.

[4] Joseph Edwards, *Integral Calculus for Beginners*, Arihant Publishers, 2016 (original 1896).

[5] Shanti Narayan and P K Mittal, *Differential Calculus*, S Chand and Company Ltd. New Delhi 2014.

[6] Shanti Narayan and P K Mittal, *Integral Calculus* S Chand and Company Ltd. New Delhi 2005.

Course 2	Practical -I	2 Credits	(56 Hours, 4 hours/week)

Practicals for I Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) Finding the limit of a function and checking the continuity of a function at a point.
2) Checking the differentiability of conditional functions.
3) Plotting of standard Cartesian curves using Maxima.
4) Finding the solutions of optimization problems.
5) Verification of Rolle's theorem and Lagrange's theorem.
6) Verification of Cauchy's mean value theorem.
7) Generating Taylor's series and Maclaurin's series.
8) Finding the equation of the tangent plane to the surface $z = f(x, y)$ and plot them.
9) Finding the average value and verification of fundamental theorem.
10) Finding the area enclosed between two curves.
11) Find the definite integrals using the reduction formula manually and then verification using maxima command.
12) Finding the partial derivatives and verification of Laplace equation.
13) Euler's theorem and Illustration examples for its verification.
14) Finding the extreme values of functions of two variables.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

II Semester

Course 3	Advanced Calculus and Differential Equations	3 Credits	(56 Hrs, 4 hrs/week)

Course Objectives:

- To develop a comprehensive understanding of polar coordinates, their applications in graphing, and the analysis of conic sections.
- To gain proficiency in evaluating line integrals and multiple integrals, and understanding their applications in various coordinate systems.
- To provide a solid foundation in differential equations, including methods for solving first-order differential equations.
- To explore practical applications of differential equations in various fields, enhancing problem-solving skills.

- To understand more complex differential equations, including nonlinear equations and orthogonal trajectories, and their solutions.

Course Outcomes:

- Students will be able to convert between polar and Cartesian coordinates, graph equations in polar coordinates, and calculate areas and lengths.
- Students will classify and analyze conic sections by eccentricity, and work with their polar equations to sketch and identify various conics.
- Students will evaluate line integrals over plane and space curves, understanding their applications and computations.
- Students will master double and triple integrals, including changing between Cartesian and polar coordinates, and apply these techniques to calculate volumes, areas, and averages.
- Students will understand and solve first-order differential equations using various methods, including separation of variables and integrating factors.
- Students will apply differential equations to model and solve real-world problems in physics, chemistry, and other fields.

Unit I: **(14 Hours)**

Polar Co-ordinates: Definition, Polar equations and graphs, Relating Polar and Cartesian Co-ordinates, Graphing in Polar Co-ordinates, Areas and Lengths in Polar Co-ordinates, Area of a surface of revolution.

Conic Sections: Classifying conic sections by eccentricity, Conic Sections in Polar Co-ordinates, Polar equation for lines, ellipse, parabola and hyperbola with eccentricity. Identification by finding eccentricity, and drawing the sketch .

Unit II: **(14 Hours)**

Line Integrals: Definition and Examples, Evaluating line integrals over plane curves and over space curves.

Multiple Integrals : Double Integrals over rectangles, Double integrals as volumes, Fubinis theorem for calculating double Integrals, Finding regions of Integration, Double integrals over bounded Nonrectangular regions, Volume of solids, Evaluating the double integrals, Finding regions, Reversing the order, Areas of bounded regions in the plane, Average, Volume of an integrable function, Evaluating double integrals in Polar co-ordinates, Finding limits of function, Area in Polar co-ordinates. Changing Cartesian Integral to Polar Co-ordinates, Triple integrals in Rectangular co-ordinates, Evaluating triple integrals.

Unit III: **(14 Hours)**

Recapitulation: Definitions, Families of Curves, Examples of Differential Equations, Definitions, Families of solutions, Equations of Order One, Separation of Variables.

Equations with Homogeneous Coefficient, Exact Equations, The Linear Equation of Order One, The General Solution of a Linear Equation, Integrating factors found by inspection, The Determination of Integrating Factors, Substitution Suggested by the Equation, Bernoulli's Equations.

Unit IV: **(14 Hours)**

Applications of Differential Equations : Elementary Applications Velocity of Escape from the Earth, Newton's law of Cooling, Simple Chemical Conversion Logistic Growth and the Price of Commodities.

Orthogonal Trajectories : Cartesian and Polar co-ordinates.

Nonlinear Equations, Factoring the Left Member, Singular Solutions, Eliminating the Dependent Variable, Clairaut's Equation, Dependent Variable Missing, Independent Variable Missing.

Text Book

1. Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008 (for Unit-I and Unit-II).
2. Earl D Rainville and Philip E Bedient, *Elementary Differential Equations*, Pearson, 8th Ed., 2016. (For Unit III and Unit-IV.)
3. Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991. (For Unit-IV.)

References

[1] Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008.

[2] Louis Leithold, *Calculus with Analytic Geometry*, 5th Ed., Harper and Row International, 1986.

[3] Lipman Bers *Calculus*, Holt,Rinehart & Winston of Canada Ltd., 1969.

[4] Earl D Rainville and Philip E Bedient, *A Short Course in Differential Equations*, Macmillan Ltd., 4th Ed., 1969.

[5] Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991.

[6] Joseph Edwards, *Integral Calculus for Beginners*, Arihant Publishers, 2016 (original 1896).

[7] 1. M. D. Raisinghania, Ordinary Differential Equations & Partial Differential Equations, , S. Chand & Company, New Delhi, 20th Edition - 2020.

Course 4	Practical-II	2 Credits	(56 Hours, 4 hours/week)

Practicals for II Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) General and Particular Solutions of ordinary differential equations of first order.
2) Solving the differential equations of manually.
3) Verification of the exactness of a differential equation.
4) Differential equations which are solvable for p.
5) Solving Differential equations of Clairaut's form.
6) Plotting the orthogonal trajectories.
7) Area and length of the polar curves.
8) Tracing the polar curves.
9) Identifying the conic and tracing the conic.
10) Evaluation of line integrals.
11) Evaluation of double integrals with constant and variable limits.
12) Evaluation of triple integrals with constant and variable limits.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

III Semester

Course 5	Number Theory and Higher Order Differential Equations	3 Credits	(56 Hours, 4 hours/week)

Course Objectives:

- To develop a solid understanding of basic concepts in number theory, including the division algorithm, gcd, and the fundamental theorem of arithmetic.
- To explore more complex topics in number theory such as congruences, Fermat's and Wilson's Theorems, Euler's Phi-Function, and continued fractions.
- To provide knowledge and techniques for solving linear differential equations with constant coefficients, both homogeneous and non-homogeneous.
- To introduce and apply advanced methods for solving differential equations, such as reduction of order and variation of parameters.
- To apply differential equation solving techniques to real-world problems in physics and engineering, such as vibrations and electrical networks.

Course Outcomes:

- Students will be able to apply the division algorithm, calculate gcd using the Euclidean algorithm, solve Diophantine equations, and understand the fundamental theorem of arithmetic.
- Students will understand and use the basic properties of congruences, solve linear congruences, and apply the Chinese Remainder Theorem.
- Students will be able to state and apply Fermat's Theorem, Wilson's Theorem, and Euler's Theorem, and compute Euler's Phi-Function.
- Students will solve linear differential equations with constant coefficients, including finding the complementary function and particular integral for various forms of the non-homogeneous term.
- Students will use methods such as reduction of order and variation of parameters to solve more complex differential equations.
- Students will apply differential equation techniques to model and solve practical problems, including mechanical vibrations, electrical networks, and other systems.

Unit I: **(14 Hours)**

Number Theory: Division Algorithm, The Greatest Common Divisor (g.c.d), Euclidean Algorithm, Diophantine Equations, Fundamental Theorem of Arithmetic.

The Theory of Congruences, Basic Properties of Congruences, Binary and Decimal Representation of Integers.

Unit II: **(14 Hours)**

Number Theory: Linear Congruences and The Chinese Remainder Theorem, Fermat's Theorem, Wilson's Theorem, Euler's Phi-Function, Euler's Theorem, Some Properties of Phi-Function, Simple continued fractions.

Unit III: **(14 Hours)**

Linear Equations with Constant Coefficients: Introduction, The operator D, The Auxiliary Equation, solution of homogeneous equations with constant coefficients (Distinct roots, Repeated Roots, The Imaginary Roots).

Non-homogeneous Equations: Complementary function of a linear equation with constant coefficients, Particular integral, General method of finding particular integral, Special methods for finding particular integral when RHS of the non-homogeneous differential equation is of the form: e^{ax}, $\cos ax$, $\sin ax$, x^m $e^{ax}V(x)$, where $V(x)$ is $\sin ax$, $\cos ax$ or x^m. Solution of a Non-homogeneous equations by the method of Undetermined Coefficients.

Unit IV: **(14 Hours)**

Method of Reduction of Order, Variation of Parameters, Solution of $y'' + y = f(x)$ reducing to normal form, change of independent variable method.

Applications Vibration of a Spring, Undamped Vibrations Applications to Electrical Networks The Simple Pendulum. Solution of simultaneous equations.

Text Book

1. David M. Burton., *Elementary Number Theory*, 7th Ed., McGraw Hill, 2011. (For Unit-I and Unit-II.)

2. Earl D Rainville and Philip E Bedient, *Elementary Differential Equations*, Pearson, 8th Ed., 2016. (For Unit III and Unit-IV.)

3. Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991. (For Unit III and Unit-IV.)

References

[1] Gareth A. Jones and J. Marry Jones, *Elementary Number Theory*, Springer, 1998.

[2] Earl D Rainville and Philip E Bedient, *A Short Course in Differential Equations*, Macmillan Ltd., 4th Ed., 1969.

[3] William E. Boyce, Richard C. DiPrima, *Elementary Differential Equations*, 10th Ed., Wiley Publishers, 2012.

Course 6	Practical-III	2 Credits	(56 Hours, 4 hours/week)

Practicals for III Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) On Euclidian algorithm., to find the GCD , LCM and verification of GCD LCM theorem.

2) Divisibility test (a number divisible by 9 and 11).

3) To find the solutions of Diophantine equations.

4) Solving the simultaneous equations using Chinese remainder theorem.

5) Verification of Fermat's theorem, Wilson's theorem and Euler's theorem.

6) To compute Euler's phi function for positive integers and to find the sum of all positive divisors of n.

7) Expressing a rational function as a finite continued fraction.

8) To find a rational number corresponding to a given continued fraction.

9) Solving higher order differential equations with variable coefficients manually.

10) Finding the complimentary function and particular integral of a linear differential equations.

11) Solutions of second ordered differential equations by finding the complimentary function.

12) Program to illustrate damped and undamped vibrations.

13) Solving simultaneous differential equations.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

Course 7 (a)	**Mathematical Logic and Set Theory**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- To develop a thorough understanding of propositional and predicate logic, including applications and equivalences.
- To introduce various methods and strategies for constructing mathematical proofs, emphasizing rules of inference and proof structures.
- To provide a comprehensive understanding of sets, relations, and functions, including operations, properties, and applications.
- To explore advanced topics such as equivalence relations, partial orders, and different types of functions, including one-to-one and onto functions.

Course Outcomes:

- Students will be able to construct and evaluate propositional logic statements, understand and apply logical equivalences, and solve problems using propositional logic.
- Students will be able to construct valid mathematical proofs using various methods, including direct proof, indirect proof, and proof by contradiction, applying appropriate rules of inference.
- Students will understand and work with Cartesian products, equivalence relations, and partial orders, and apply these concepts to classify and analyze relationships between elements.
- Students will be able to define and work with various types of functions, including one-to-one, onto, inverse functions, and compositions of functions, understanding their properties and applications.

Unit I: **(14 Hours)**

Mathematical Logic: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inferences, Introduction to Proofs, Proof Methods and Strategy.

Unit II: **(14 Hours)**

Relations and Functions: Sets and subsets, Set Operations and the Laws of Set Theory, Cartesian Products and Relations, Equivalence relation and partition, Partial Order. Functions: Definition and Examples, One-to-One and Onto functions, Inverse Functions and Compositions of Functions.

Text Book Ralph P. Grimaldi, Discrete Combinatorial Mathematics, 5th Ed., Pearson, 2006.

References

[1] David J. Hunter *Essentials of Discrete Mathematics*, 4th Ed.,Jones & Bartlett Learning Company, 2021.

[2] Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Ed., McGraw Hill, 2012.

[3] D. I. A. Cohen, Basic Techniques of Combinatorial Theory, John Wiley and Sons, New York, 1978.

[4] Fred S. Roberts, Barry Tesman, Applied Combinatorics, 2nd Ed., CRC Press, 2009.

[5] JG. E. Martin, Counting: The Art of Enumerative Combinatorics, UTM, Springer, 2001.

Course 7(b)	**Quantitative Mathematics**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- Gain foundational knowledge of number systems, divisibility tests, HCF, LCM, decimal fractions, and simplification techniques.
- Enhance skills in solving problems related to averages, numbers, and ages through practical applications.
- Learn to calculate percentages, profit and loss, ratios, proportions, and understand the concepts of partnership.
- Tackle calendar and clock problems, and apply mathematical principles to solve problems involving heights and distances.

Course Outcomes:

Upon successful completion of this course,

- Students will be able to apply knowledge of number systems, divisibility, HCF, LCM, and decimal fractions to solve mathematical problems.
- Students gets ability to Solve arithmetic problems, handle simplification tasks, compute averages, and solve number and age-related problems effectively.
- Students will be able to calculate percentages, understand profit and loss, and solve problems involving ratios, proportions, and partnerships.
- Students will be able to address practical scenarios, solve calendar and clock problems, and apply mathematical concepts to determine heights and distances.

Unit I: **(14 Hours)**

Number System, Divisibility Tests, HCF and LCM of numbers. Decimal Fractions, Simplification, Average, Problems on numbers, Problems on ages.

Unit II: **(14 Hours)**

Percentage,Profit and Loss, Ratio and Proportion, Partnership, Calender Problems, Clock Problems, Heights and Distances.

Text Book R.S. Agarwal, Quantitative Aptitude, S. Chand and Company Limited, New Delhi -2021.

References

[1] Abhijit Guha, Quantitative Aptitude, Mc.Grawhill publications, 5thEdition - 2014.

[2] R. V. Praveen, Quantitative Aptitude and Reasoning, PHI publishers, 3rd Edition – 2016.

[3] R. S. Aggarwal, Objective Arithmetic, S. Chand & Company Ltd, Revised Edition – 2018.

[4] Qazi Zameeruddin,Vijay K. Khanna, S. K. Bhambri, Business Mathematics, S. Chand publications, 2ndEdition - 2009.

[5] S. K. Sharma and Gurmeet Kaur, Business Mathematics, Sultan Chand & Sons – 2019.

[6] Hazarika Padmalochan, A Text Book of Business mathematics for B.Com and BBA Course, S. Chand Publication-2017.

[7] N. G. Dasand, J. K. Das, Business Mathematics and Statistics, Mc.Grawhill Education-2017.

IV Semester

Course 8	**Group Theory, Sequences and Series**	**3 Credits**	**(56 Hrs, 4 hrs/week)**

Course Objectives:

The course will help the students

- To introduce the fundamental concepts of group theory, including binary operations, group structures, and subgroups.
- To explore deeper aspects of group theory such as cosets, normal subgroups, homomorphisms, and isomorphism theorems.
- To provide a comprehensive understanding of sequences, their properties, and the theorems related to sequence limits and convergence.
- To develop skills in analyzing series, including tests for convergence, and understanding the behavior of series with positive terms and alternating series.

Course Outcomes:

- Students will understand and apply concepts of binary operations, group structures, and subgroups, including cyclic subgroups and permutation groups.
- Students will be able to work with cosets, direct products, finitely generated abelian groups, and understand and apply theorems related to homomorphisms and factor groups.
- Students will be able to analyze sequences of real numbers, determine their convergence, and apply theorems such as Bolzano-Weierstrass and Cauchy's convergence criteria.

- Students will understand and apply various tests for series convergence, analyze geometric and harmonic series, and distinguish between absolute and conditional convergence.
- Students will be able to apply the theoretical concepts of group theory and sequence analysis to solve complex problems in mathematics.

Unit I: **(14 Hours)**

Group Theory: Binary Operations, Isomorphic Binary Structures, Groups, Examples (Abelian and non-abelian), Finite Groups and Group Tables, Subgroups, Cyclic subgroups, Cyclic Groups, Structure of Cyclic Groups, Subgroups of Finite Cyclic Groups, Groups of Permutations - Orbits, Cycles and Alternating Groups.

Unit II: **(14 Hours)**

Group Theory (contd.): Cosets and the Theorem of Lagrange, Direct Products and Finitely Generated Abelian Groups. Homomorphisms, Kernel of a Homomorphism, Normal Subgroups, Factor Groups, Isomorphism Theorems (First, Second and Third).

Unit III: **(14 Hours)**

Sequences: Recapitulation of number system - Real line, bounded sets, suprimum and infimum of a set, Archimedean property of $\mathbb{R}$. Intervals, Neighborhood of a point, open sets, closed sets, limit points. Sequences of real numbers, Bounded sequences. Limit of a sequence, convergent, divergent, and oscillatory sequences. Monotonic sequences, Algebra of convergent sequences. Limit points of a sequence, Bolzano Weierstrass theorem for sequence. Cauchy's first and second theorem on limits of a sequence. Cauchy's general principle for convergence of a sequence. Subsequence and their properties.

Unit IV: **(14 Hours)**

Definition of convergent, divergent and oscillatory series. Series of non-negative terms, Cauchy's general principle of convergence. Geometric series, P-series (Harmonic series). Comparison tests for positive term series. D'Alembert's ratio test, Raabe's test. Cauchy's Root test and Cauchy's integral test. Alternating series. Leibnitz's theorem. Absolute convergence and conditional convergence of a series.

Text Book:

1. J. B. Fraleigh and N. Brand, A First Course in Abstract Algebra, 8th Edition, Pearson, 2014. (For Unit I and Unit-II)
2. S.C. Mallik ansd Savita Arora, *Mathematical Analysis*, New Age International Publishers, 6th edition 2022. (For Unit III and Unit-IV)

References

[1] N. S Gopalakrishnan, *University Algebra*, 3rd Ed., New Age International Publications, 2015.

[2] G. D. Birkoff and S Maclane, *A brief Survey of Modern Algebra*, 2nd Ed., IBH Publishing Company, Bombay, 1967.

[3] Joseph Gallian, *Contemporary Abstract Algebra*, Narosa, 1999.

[4] I. N. Herstein, *Topics In Algebra*, 2nd Ed., Wiley Publishers, 1975.

[5] S.C Mallik, *Principles of Real Analysis*, New Age International Publications, 2008.

Course 9	Practical-IV	2 Credits	(56 Hrs, 4 hrs/week)

Practicals for IV Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) Verification of binary operation.
2) Finding the identity and inverse element in a group.
3) Finding all possible subgroups of a group.
4) Construction of the Cayley's table.
5) Finding the generators of a cyclic group.
6) Finding the left and right cosets and index of a group.
7) Verification of the Lagrange's theorem.
8) Testing the convergence of the sequence.
9) Convergence of positive term series using Cauchy's criterion
10) Convergence of geometric series, p–series, convergence using limit form.
11) Convergence of positive term series using D'lembert's test , n^{th} root test, Cauchy's integral test, Raabe's test.
12) Convergence of alternating series using Leibnitz's test.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

Course 10(a)	Basic Combinatorial Theory	2 Credits	(28 Hrs, 2 hrs/week)

Course Objectives:

The course will help the students

- To introduce students to the basic principles of counting, including permutations, combinations, and binomial coefficients, and their applications.
- To explore advanced counting methods such as the Pigeon-hole Principle, Principle of Inclusion-Exclusion, and derangements, and their applications in solving combinatorial problems.
- To develop proficiency in generating functions as a tool for solving combinatorial problems, including partition of integers and applications of exponential generating functions.
- To understand and solve first and second-order linear homogeneous and non-homogeneous recurrence relations using methods such as generating functions.

Course Outcomes:

- Students will be able to apply counting principles to solve problems involving permutations, combinations, and binomial coefficients.
- Students will apply the Pigeon-hole Principle, Principle of Inclusion-Exclusion, and derangements to solve complex combinatorial problems.
- Students will be proficient in using generating functions to solve problems related to partitioning integers and other combinatorial applications.
- Students will understand and solve first and second-order linear homogeneous and non-homogeneous recurrence relations, applying techniques such as generating functions to find solutions.
- Students will develop strong problem-solving skills in combinatorial mathematics, applying counting principles, generating functions, and recurrence relations to solve a variety of problems.

Unit I: **(14 Hours)**

Counting: The Basics of Counting, Pigeon-hole Principle, Permutations and Combinations, Binomial Coefficients and identities, Generalized Permutations and Combinations.

Advanced Counting Techniques: Principle of Inclusion-Exclusion, Generalizations of the Principle, Derangements.

Unit II: **(14 Hours)**

Generating Functions: Introductory Example, Calculation Techniques, Partition of integers, Exponential Generating Function, The Summation operator.

Recurrence Relations: The First Order Linear Recurrence Relations, Second Order Linear Homogeneous Recurrence Relations with Constant Coefficients, Non- homogeneous Recurrence Relations, The method of Generating Functions.

Text Book Ralph P. Grimaldi, Discrete Combinatorial Mathematics, 5th Ed., Pearson, 2006.

References

[1] David J. Hunter *Essentials of Discrete Mathematics*, 4th Ed.,Jones & Bartlett Learning Company, 2021.

[2] Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Ed., McGraw Hill, 2012.

[3] D. I. A. Cohen, Basic Techniques of Combinatorial Theory, John Wiley and Sons, New York, 1978.

[4] Fred S. Roberts, Barry Tesman, Applied Combinatorics, 2nd Ed., CRC Press, 2009.

[5] JG. E. Martin, Counting: The Art of Enumerative Combinatorics, UTM, Springer, 2001.

Course 10(b)	**Vedic Mathematics**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- Learn the 16 Suthras, 13 Subsuthras, terms, operations, and concepts of base and deficiency in Vedic mathematics.
- Apply Vedic methods for addition, subtraction, multiplication, and division, including special techniques and practical applications.
- Study osculators, divisibility tests, bar numbers, and the vertically and crosswise method for simplifying and comparing fractions.
- Use Vedic techniques for squaring numbers, finding square roots, and calculating cubes and cube roots.

Course Outcomes:

Upon successful completion of this course,

- Students will be able to apply Vedic Suthras and Subsuthras to perform arithmetic operations efficiently and accurately.
- Students will get used to Vedic techniques for quick addition, subtraction, multiplication, and division, enhancing calculation speed and accuracy.
- Students gets ability to implement advanced methods like osculation, bar numbers, and the vertically and crosswise method for solving complex arithmetic problems.
- Students will be able to calculate squares, square roots, cubes, and cube roots using Vedic methods, improving problem-solving skills in various mathematical contexts.
- Students will be able to simplify and compare fractions effectively using Vedic arithmetic techniques, facilitating easier and faster computation.

Unit I: **(14 Hours)**

Introduction, 16 Suthras, 13 Subsuthras of Vedaganitha, Terms and Operations, Vinculum Numbers, The concept of Base and Deficiency

Addition: Digit Sums, Adding Digits, Nine Point Circle, Casting out Nines, Digit Sum Puzzles, Digit sum Chek.

Subtraction: All from 9 and Last from 10 rule for Subtraction, Application in Day today life.

Multiplication: Multiplication of two numbers using Base and Sub base method in different cases, Ekadhikenpurven method Urdhvatiragbhyam method two/, Nikhilam Navtashchramam

Dashtaha Combined Operations. Multiplication by Doubling and Halving.
Division: Special methods of Division, Number splitting, Division by 9 and 11, Division by two digit number using Nikhilam Navtashchramam Dashtaha Suthra.

Unit II: **(14 Hours)**

Osculators , Divisibility Test by Osculation Process
Bar Numbers, Removing Bar numbers, and Creating Bar Numbers.
Multiplying Binomials, Simplification and Comparison of fractions by Vertically and Crosswise method.
Square of numbers ending with 5, Square of numbers below 50,Nearer to base, near subbase, General Method for Squaring.
Square Roots, Reverse squaring to find Square Root of Numbers ending in 25, Square root of perfect squares, General method of Square Roots, Cube and Cube roots.

Text Books

1. Sri BharatiKrsnaTirthaji, "Vedic Mathematics", published by MotilalBanarsidass, 1965. ISBN 81-208-0163-6.
2. Fundamentals & Applications Ofvedic Mathematics by State Council of Educational Research & TrainingVarun Marg, Defence Colony, New Delhi-110024, Published by : State Council of Educational Research & Training, New Delhi and printed at Educational Stores, S-5, Bsr. Road Ind. Area, Ghaziabad (U.P.)
3. Vedic Mathematics Teachers Manual:Elementary Level by Kenneth R Williams, ISBN 978-1-902517-16-2 Published by Inspiration Books

References

[1] Williams K.R. "Discover Vedic Mathematics." Vedic Mathematics Research Group, 1984.

[2] Williams K.R. and M. Gaskell "The Cosmic Calculator". Motilal Banarsidass, 2002.

[3] Nicholas A.P., Williams, J. Pickles. "Vertically and Crosswise". Inspiration Books, 1984.

[4] Vedic Mathematics, Motilal Banarsidass Publishers, NewDelhi -1990.

[5] Vedic Ganita: Vihangama Drishti-1, SikshaSanskriti Uthana Nyasa, New-Delhi.

[6] Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New-Delhi.

Question Paper Patterns for Semester Exams

B.Sc. Mathematics (Three Major Scheme)

Theory (3 credit core courses)

For I /II / III/ IV Semesters

Duration: 3 hours Max. Marks: 80

PART -A	
I. Answer any 10 questions out of 14 questions ($10 \times 2 = 20$)	
Question Number	Unit 1 to 4
1 to 14	At least 3 questions from each unit
PART -B	
II. Answer 12 questions by choosing any three from each unit ($12 \times 5 = 60$)	
Question Number	Units
1 to 5	Unit - 1
6 to 10	Unit - 2
11 to 15	Unit - 3
16 to 20	Unit - 4

Theory (2 credit elective courses)

For III/ IV Semesters

Duration: 2 hours Max. Marks: 40

PART -A	
I. Answer any 5 questions out of 8 questions ($5 \times 2 = 10$)	
Question Number	Unit Number
1 to 4	Unit - 1
5 to 8	Unit - 2
PART -B	
II. Answer 6 questions by choosing any three from each unit ($6 \times 5 = 30$)	
Question Number	Units
1 to 5	Unit - 1
6 to 10	Unit - 2

For Semesters I to IV

Semester Practical Exam 40 marks +Lab Internal Assessment 10 marks =50 marks

Components	Marks
Record	5
Program (writing and execution)	30
Viva	5

Lab Internal assessment: Lab internal assessment marks should be based on two lab tests.

ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ–(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ಕಲಾಗಂಗೋತ್ರಿ– ಬಿ.ಎ

Course Out Comes:

೧. ಸಂಪರ್ಕ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಮೌಲ್ಯಗಳನ್ನು ಬಹುಶಿಸ್ತೀಯ ಪದವಿ ಕೋರ್ಸುಗಳಲ್ಲಿ ಬೆಳೆಸುವುದು ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶ

೨. ಸಾಹಿತ್ಯ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯಿಕ ಅಭಿರುಚಿ ಮೂಡಿಸುವ ಉದ್ದೇಶ.

೩. ನಾಡು–ನುಡಿಯ ಅಭಿಮಾನವನ್ನು ಬೆಳೆಸುವಲ್ಲಿ ಪೂರಕ.

೪. ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯದಿಂದ ಮಾತ್ರ ಸಮಾಜದಲ್ಲಿ ಮನುಷ್ಯ ಉತ್ತಮ ನಾಗರಿಕನಾಗಿ ಬದುಕಲು ಅಗತ್ಯವಾದ ಸಂವೇದನೆಯನ್ನು ಹುಟ್ಟು ಹಾಕಲು ಸಾಧ್ಯ

೫. ಭಾಷೆ ಕೇವಲ ಮಾಧ್ಯಮವಾಗಿರದೇ ಅದೊಂದು ಸಂಸ್ಕೃತಿಯಾಗಿರುತ್ತದೆ.

೬. ನಾಡು– ನುಡಿ ಜಲ, ಭೂಮಿ, ಸಮಕಾಲೀನ ಸವಾಲುಗಳನ್ನು ಕನ್ನಡಾದ ಅತ್ಯುತ್ತಮ ಪಠ್ಯಗಳ ಮುಖಾಂತರ ಕಲಿಸಬಹುದೆನ್ನುವ ನಂಬಿಕೆ.

೭. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ನಮ್ಮ ಸಮೃದ್ಧ ಸಾಂಸ್ಕೃತಿಕ, ಸಾಹಿತ್ಯಿಕ ಪರಂಪರೆಯ ಅರಿವು ಮೂಡಬೇಕು ಎಂಬ ಕಾಳಜಿ.

೮. ಸೃಜನಶೀಲತೆ ಮತ್ತು ಸಂವಹನ ಕೌಶಲ್ಯವನ್ನು ಕಲಿಯುವುದು ಇಂದಿನ ಅತೀ ತುರ್ತು, ಅದಕ್ಕೆ ಭಾಷಾ ಬೋಧನೆ ಅತೀ ಅಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿ.ಎ/ ಬಿಎ. ಬಿಎಸ್ ಡಬ್ಲ್ಯು/ಬಿಎ. ಹೆಚ್ಆರ್‌ಡಿ/ಬಿಎ. ಎಸ್‌ಡಿಎಸ್

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಕಲಾಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಸ್ಮಶಾನ ಕುರುಕ್ಷೇತ್ರಂ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿ.ಎ/ ಬಿಎ. ಬಿಎಸ್ ಡಬ್ಲು/ಬಿಎ. ಹೆಚ್ಆರ್‌ಡಿ/ಬಿಎ. ಎಸ್‌ಡಿಎಸ್

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಕಲಾಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಕಾಮನ ಹುಣ್ಣಿಮೆ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ– ಬಿ.ಕಾಂ

Course Out Comes:

೧. ಹಲವು ಬಗೆಯ ಬಿಕ್ಕಟ್ಟುಗಳು ಮತ್ತು ವಿಷಮತೆಗಳು ಹೆಚ್ಚುತ್ತಿರುವ ಈ ಕಾಲಘಟ್ಟದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರಜ್ಞಾವಂತರನ್ನಾಗಿ, ಸಂವೇದನಾಶೀಲರನ್ನಾಗಿ ಮಾಡುವ ಅವಕಾಶ ಭಾಷಾ ಪಠ್ಯಗಳಲ್ಲಿ ಇರುತ್ತದೆ.

೨. ಕನ್ನಡವನ್ನು ಜ್ಞಾನದ ಭಾಷೆಯಾಗಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನೀಡಬೇಕೆನ್ನುವ ಆಶಯ.

೩. ಇಂದಿನ ಶಿಕ್ಷಣದ ಮುಖ್ಯ ಗುರಿ ಉದ್ಯೋಗ ಮತ್ತು ಕೌಶಲ್ಯಗಳೇ ಆಗಿವೆ. ಹೀಗಾಗಿ ತಾಯಿ ಭಾಷೆ ಕನ್ನಡದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ಥಳೀಯ ರಾಷ್ಟ್ರೀಯ ಮತ್ತು ಜಾಗತಿಕ ಸವಾಲುಗಳನ್ನು ಸನ್ನದ್ಧರಾಗುವ ಬಗೆಯಲ್ಲಿ ಬೋಧಿಸುವ ಉದ್ದೇಶ

೪. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯಕ ಅಭಿರುಚಿಯನ್ನು ಹೆಚ್ಚಿಸುವ ಉದ್ದೇಶ.

೫. ವ್ಯವಹಾರದಲ್ಲಿ ಯಶಸ್ಸು ಕಾಣಲು ಸುಲಲಿತವಾದ ಭಾಷೆಯ ಕಲಿಕೆಯ ಅಗತ್ಯವಿದೆ.

೬. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃಯ ಬೆಳಕು ನೀಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಉದ್ದೇಶ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಕಾಂ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಏಕಲವ್ಯ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಕಾಂ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಕಿರಗೂರಿನ ಗಯ್ಯಾಳಿಗಳು)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಕಾಂ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ ಒಟ್ಟು –೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ – ಬಿಎಸ್ಸಿ

Course Out Comes:

೧. ಭಾಷೆಸಂವಹನ ಕೌಶಲ್ಯದ ಜೊತೆಗೆ ಎಲ್ಲಾ ಜ್ಞಾನ ಶಸ್ತ್ರಗಳನ್ನು ಜೋಡಿಸುವ ಕೆಲಸವನ್ನು ಮಾಡುತ್ತದೆ.

೨. ಭಾಷೆ ಸಂವಹನ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಮೌಲ್ಯಗಳನ್ನು ಬಹುಶಿಸ್ತೀಯ ಪದವಿ ಕೋರ್ಸುಗಳಲ್ಲಿ ಬೆಳೆಸುವುದು ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶ.

೩. ವಿಜ್ಞಾನದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕಲೆ, ಸಾಹಿತ್ಯ ಅಭಿರುಚಿಯನ್ನು ಮೂಡಿಸುವುದು

೪. ವೈಚಾರಿಕತೆಯ ಜೊತೆಗೆ ಸಾಹಿತ್ಯದಲ್ಲಿ ಚರ್ಚಿತವಾದ ತಂತ್ರಜ್ಞಾನ, ಪರಿಸರ, ಆಧುನಿಕತೆಯ ಪ್ರಭಾವ ವ್ಯಕ್ತಿ, ಸಮಾಜದ ಪರಿವರ್ತನೆ ಇವುಗಳನ್ನೆಲ್ಲಾ ಕಲಿಸುವ ಉದ್ದೇಶ.

೫. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಾಮಾನಗಳ ಅರಿವು ಸಂಸ್ಕೃತಿಯ ಬೆಳಕು ನೀಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಉದ್ದೇಶ.

೬. ವಿಜ್ಞಾನದ ಮೂಲಕ ವೈಜ್ಞಾನಿಕತೆಯನ್ನು ಕಲಿತವರು, ಸಾಹಿತ್ಯದ ಮೂಲಕ ಬಾಂದವ್ಯ ಉಳಿಸಿಕೊಳ್ಳಲು ಭಾಷೆಯ ಬೋಧನೆ ಅತ್ಯಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಎಸ್ಸಿ/ಬಿಎಸ್ಸಿ (ಎಫ್ಎನ್‌ಡಿ)/ಬಿಎಸ್ಸಿ (ಹೆಚ್ಎಸ್)/ಬಿಎಸ್ಸಿ (ಸಿಎಸ್)/ ಬಿಎಸ್ಸಿ (ಫ್ಯಾಶನ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಗಾರ್ಮೆಂಟ್ ಡಿಸೈನ್) /ಬಿಎಸ್ಸಿ (ಲೆದರ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಇಂಟಿರಿಯರ್ ಡಿಸೈನ್ ಆಂಡ್ ಡೆಕೊರೇಶನ್) ಬಿಎಸ್ಸಿ (ಅನಿಮೇಶನ್ ಆಂಡ್ ವಿಜುವಲ್ ಇಫೆಕ್ಟ್) ಬಿಎಸ್ಸಿ (ಕೌನ್ಸಿಲಿಂಗ್) ಬಿಎಸ್ಸಿ (ಪುಡ್ ಟೆಕ್ನಾಲಜಿ)

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಅಂತಿಗೊನೆ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಎಸ್ಸಿ/ಬಿಎಸ್ಸಿ (ಎಫ್ಎನ್‌ಡಿ)/ಬಿಎಸ್ಸಿ (ಹೆಚ್ಎಸ್)/ಬಿಎಸ್ಸಿ (ಸಿಎಸ್)/ ಬಿಎಸ್ಸಿ (ಫ್ಯಾಶನ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಗಾರ್ಮೆಂಟ್ ಡಿಸೈನ್) /ಬಿಎಸ್ಸಿ (ಲೆದರ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಇಂಟಿರಿಯರ್ ಡಿಸೈನ್ ಆಂಡ್ ಡೆಕೊರೇಶನ್) ಬಿಎಸ್ಸಿ (ಅನಿಮೇಶನ್ ಆಂಡ್ ವಿಜುವಲ್ ಇಫೆಕ್ಟ್) ಬಿಎಸ್ಸಿ (ಕೌನ್ಸಿಲಿಂಗ್) ಬಿಎಸ್ಸಿ (ಪುಡ್ ಟೆಕ್ನಾಲಜಿ)

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೪೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಒಡಲಾಳ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಎಸ್ಸಿ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ನಿವರ್ಹಣಾ ಗಂಗೋತ್ರಿ – ಬಿ.ಬಿ.ಎ

Course Out Comes:

೧. ನಿರ್ವಹಣಾ ಶಾಸ್ತ್ರದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕಲೆ– ಸಾಹಿತ್ಯ ಸಂಸ್ಕೃತಿಯ ಅಭಿರುಚಿಯನ್ನು ಹುಟ್ಟು ಹಾಕುವ ಉದ್ದೇಶ.

೨. ಭಾಷೆಯ ಕಲಿಕೆಯ ವಾಧ್ಯಮದ ಜೊತೆಗೆ ವೈಯಕ್ತಿಕ, ಸಾಮಾಜಿಕ, ಆಡಳಿತಾತ್ಮಕ ಔದ್ಯೋಗಿಕ, ವಾಣಿಜ್ಯ ವ್ಯವಹಾರ, ನಿರ್ವಹಣೆಗಳ ಮೇಲೆ ಮಹತ್ವವನ್ನು ನೀಡುವುದಾಗಿದೆ.

೩. ಕಲೆ, ಸಾಹಿತ್ಯ, ನಾಡು– ನುಡಿಯ, ಅಭಿಮಾನದ ಜೊತೆಗೆ ನೈತಿಕತೆಯ ಅರಿವು ಪಡೆಯಲು ಭಾಷಾ ಬೋಧನೆಯ ಅಗತ್ಯ.

೪. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃತಿಯ ಕಲಿಕೆಯಲ್ಲಿ ಭಾಷಾ ಬೋಧನೆಯ ಮಹತ್ವದ ಪಾತ್ರವನ್ನು ವಹಿಸುತ್ತದೆ.

೫. ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃತಿ, ರಾಷ್ಟ್ರೀಯತೆಯ ಮನೋಭಾವವನ್ನು ಕಟ್ಟಿಕೊಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಆಶಯ.

೬. ವಿದ್ಯಾರ್ಥಿಗಳು ಸಮಾಜದಲ್ಲಿ ಉತ್ತಮ ನಾಗರಿಕನಾಗಿ ಬದುಕಲು ಅಗತ್ಯವಾದ ಸಂವೇದನೆಯನ್ನು ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ ರೂಪಿಸುತ್ತದೆ. ಭಾಷೆ ಕೇವಲ ಮಾಧ್ಯಮವಾಗಿರದೆ ಅದೊಂದು ಸಂಸ್ಕೃತಿಯಾಗಿರುತ್ತದೆ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಬಿಎ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ನಿರ್ವಹಣಾಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಯಶೋಧರಾ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಬಿಎ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ನಿರ್ವಹಣಾಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಮುಖಾಂತರ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಬಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು –೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8
(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8
(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8
(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ಗಣಕ ಗಂಗೋತ್ರಿ – ಬಿ.ಸಿ.ಎ

Course Out Comes:

೧. ಗಣಕ ವಿಜ್ಞಾನದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯದ ಅಭಿರುಚಿ ಮೂಡಿಸುವ ಉದ್ದೇಶ.

೨. ಕಂಪ್ಯೂಟರ್ ಯುಗದಲ್ಲಿ ಜೀವನ ಯಾಂತ್ರಿಕವಾಗದಿರಲು ಭಾಷೆಯ ಮೂಲಕ ಕಲೆ, ಸಾಹಿತ್ಯ,ಸಂಸ್ಕೃತಿಯ ಕಲಿಕೆ ಇಂದಿನ ಅಗತ್ಯ.

೩. ಹಲವು ಬಗೆಯ ಬಿಕ್ಕಟ್ಟುಗಳು ಮತ್ತು ವಿಷಮತೆಗಳು ಹೆಚ್ಚುತ್ತಿರುವ ಈ ಕಾಲಘಟ್ಟದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರಜ್ಞಾವಂತರನ್ನಾಗಿ ಸಂವೇದನಾಶೀಲರನ್ನಾಗಿ ಮಾಡುವ ಅವಕಾಶ ಭಾಷಾ ಪಠ್ಯಗಳಲ್ಲಿ ಇರುತ್ತದೆ.

೪. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯಗಳನ್ನು ಕುರಿತ ಪ್ರೀತಿಯನ್ನು ಹೆಚ್ಚಿಸಬೇಕು ಆ ಮೂಲಕ ನಮ್ಮ ಸಮೃದ್ಧ, ಸಾಂಸ್ಕೃತಿಕ ಸಾಹಿತ್ಯಕ ಪರಂಪರೆಯ ಅರಿವು ಅವರಲ್ಲಿ ಮೂಡಬೇಕು ಎಂಬ ಆಶಯ.

೫. ಕಂಪ್ಯೂಟರ್ ಯುಗದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಮಾನವೀಯ ಸಂವೇದನೆಯನ್ನು ಹುಟ್ಟು ಹಾಕಲು ಭಾಷಾ ಬೋಧನೆಯು ಅಗತ್ಯ

೬. ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ, ಭಾಷೆಯ ಬಳಕೆಯ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಕಲಿಯಲು ಭಾಷಾ ಬೋಧನೆಯು ಅಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಸಿಎ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಗಣಕಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಯುದ್ಧಭಾರತ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಸಿಎ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಗಣಕಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನೀಳ್ಗತೆ(ಮಣ್ಣು)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಸಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಕನ್ನಡ ಐಚ್ಛಿಕ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೭೨ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್: ೦೫ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು = ೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: =೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೩೬ ಗಂಟೆ	೫೦
೨. ಸಣ್ಣಕತೆ	೧೦ ಗಂಟೆ	೩೦
೩. ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ	೨೦ ಗಂಟೆ	೩೦
೪. ಛಂದಸ್ಸು	೦೬ ಗಂಟೆ	೧೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಕನ್ನಡ ಐಚ್ಛಿಕ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೭೨ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್: ೦೫ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು = ೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: =೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೩೬ ಗಂಟೆ	೪೫
೨. ಗದ್ಯಭಾಗ	೧೦ ಗಂಟೆ	೨೫
೩. ನಾಟಕ	೧೦ ಗಂಟೆ	೨೦
೪. ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ	೨೦ ಗಂಟೆ	೩೦

ಪ್ರಥಮ ಬಿ. ಎ ಕನ್ನಡ ಐಚ್ಛಿಕ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024) ಪಠ್ಯಕ್ರಮದಂತೆ

ಪಠ್ಯ: ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ – ೧

ಪ್ರಕಾಶಕರು: ಪ್ರಸಾರಾಂಗ, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ

ಬೋಧನಾವಧಿ– ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಪರೀಕ್ಷಾ ಅವಧಿ–೦೩ಗಂಟೆಗಳು ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಕ್ರೆಡಿಟ್–೦೫ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

ಹೊಸಗನಡ ಕಾವ್ಯ ಗದ್ಯ– ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ (ಚರಿತ್ರೆ)

ಕಾವ್ಯ ಭಾಗ ಬೋಧನಾವಧಿ (೩೫ ಗಂಟೆ– ಅಂಕ– ೩೫ ಅಂಕಗಳು)

೧. ತೂಕಡಿಕೆಯ ಕಳೆ – ಪಂಜೆ ಮಂಗೇಶರಾವ್

೨. ಕಾಣಿಕೆ– ಬಿ. ಎಂ ಶ್ರೀ

೩. ಗಂಗಾವತರಣ– ದ. ರಾ ಬೇಂದ್ರೆ

೪. ತನ್ನ ಕಾವ್ಯಕ್ಕೆ ತಾಂ ಮಹಾಕವಿ ಮಣಿವಂತೆ– ಕುವೆಂಪು

೫. ನಿಲ್ಲಿಸದಿರು ವನಮಾಲಿ– ಪು. ತಿ. ನ

೬. ರತ್ನನೆ ಪ್ರಪಂಚ – ಜಿ. ಪಿ ರಾಜರತ್ನಂ

೭. ನಾನೊಮ್ಮೆ ಚೆಲುವೆಯೊಬ್ಬಳನ್ನು ಪ್ರೀತಿಸಿದೆ– ಕೆ. ಎಸ್. ನರಸಿಂಹ ಸ್ವಾಮಿ

೮. ಹರಿಗೋಲು– ಮಚ್ಚಿಮಲೆ ಶಂಕರನಾರಾಯಣರು

೯. ಎಣ್ಣೆ ಹೊಯ್ಯಮ್ಮ ದೀಪಕ್ಕೆ –ಸೇಡಿಯಾಪು ಕೃಷ್ಣಭಟ್ಟ

೧೦.ಕಾರ್ಗಾಲದ ವೈಭವ – ಕಡೆಂಗೋಡ್ಲು ಶಂಕರಭಟ್ಟ

೧೧ ಬೆಂಕಿ ಬಿದ್ದಿದೆ ಮನೆಗೆ– ಕಯ್ಯಾರ ಕಿಞಣ್ಣ ರೈ

೧೨.ಕೆಲವು ವಚನಗಳು– ಎಸ್. ವಿ ಪರಮೇಶ್ವರಭಟ್ಟ

ಗದ್ಯ ಭಾಗ (ಸಣ್ಣಕಥೆಗಳು) ಬೋಧನಾವಧಿ– ೭ಗಂಟೆ– ಅಂಕಗಳು – ೨೦

೧. ಹೇಮ ಕೂಟದಿಂದ ಬಂದ ಮೇಲೆ – ಮಾಸ್ತಿ ವೆಂಕಟೇಶ ಅಯ್ಯಂಗಾರ್

೨. ಹೋಳಿಗೆ – ಶಿವರಾಮ ಕಾರಂತ

೩. ಶವದ ಮನೆ–ಚದುರಂಗ

೪. ಅವಳ ಉದ್ಧಾರ–ಗಿರಿಬಾಲೆ

೫. ಬಯಲಾಟ– ದೇವಾಂಗನಾ ಶಾಸ್ತ್ರಿ

ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ–ಬೋಧನಾವಧಿ – ೨೫ಗಂಟೆ ಅಂಕಗಳು –೨೫

೧. ನವೋದಯ ಪೂರ್ವ ನವೋದಯ ಸಾಹಿತ್ಯದ ಪ್ರೇರಣೆ ಮತ್ತು ಪ್ರಭಾವ ನವೋದಯ ಕಾಲ ಘಟ್ಟದ ಪ್ರಮುಖ ಸಾಹಿತ್ಯ ಸ್ವರೂಪಗಳ ಕೊಡುಗೆ – ಕಾವ್ಯ, ನಾಟಕ , ಸಣ್ಣಕಥೆ, ಕಾದಂಬರಿ

೨. ಪ್ರಗತಿಶೀಲ ಸಾಹಿತ್ಯ – ಪ್ರೇರಣೆ ಪ್ರಭಾವ– ಅನಕೃ, ತ.ರಾ.ಸು, ನಿರಂಜನ, ಕಟ್ಟಿಮನಿಯವರ ಪರಿಚಯ

೩. ಮಹಿಳಾ ಸಾಹಿತ್ಯ– ಪ್ರೇರಣೆ ಮತ್ತು ಪ್ರಭಾವ – ಕಥೆಗಾರರು ಮತ್ತು ಕಾದಂಬರಿಕಾರರ ಪರಿಚಯ

ಸೂಚನೆ: ಸಾಹಿತ್ಯ ಗಂಗೋತ್ರಿ– ೧ ಪಠ್ಯದ ಹೊಸಗನ್ನಡ ಛಂದಸ್ಸನ್ನು ಸಂಪೂರ್ಣ ಕೈಬಿಡಲಾಗಿದೆ.

ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024)

ಕನ್ನಡ ಐಚ್ಛಿಕ (ಪ್ರಥಮ ಚತುರ್ಮಾಸ)

ಒಟ್ಟು ಅಂಕಗಳು: 80

ಪರೀಕ್ಷೆ:೩ ಗಂಟೆಗಳು ಘಟಕ–೧ ಕಾವ್ಯ 35 ಅಂಕಗಳು

I ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ: 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

II ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 02x04=08
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

III ಮೂರಕ್ಕೆ ಸಂದರ್ಭ ಸ್ವಾರಸ್ಯ ಬರೆಯಿರಿ. 03x04=12
ಐದು ವಾಕ್ಯಗಳನ್ನು ನೀಡುವುದು

IV ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ 01x05=05
ಐದು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೨ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ 25 ಅಂಕಗಳು

V ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

VI ಮೂರು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 03x04=12
ಐದು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

VII ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 01x03=03
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

ಘಟಕ ೩ ಕಥೆಗಳು 20 ಅಂಕಗಳು

VIII ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

IX ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ 02x03=06
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

X ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 04x01=04
ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

ಪ್ರಥಮ ಬಿ. ಎ ಕನ್ನಡ ಐಚ್ಛಿಕ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024) ಪಠ್ಯಕ್ರಮದಂತೆ

ಪಠ್ಯ: ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ – ೨

ಪ್ರಕಾಶಕರು: ಪ್ರಸಾರಾಂಗ, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ

ಬೋಧನಾವಧಿ– ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಪರೀಕ್ಷಾ ಅವಧಿ–೦೩ಗಂಟೆಗಳು ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಕ್ರೆಡಿಟ್–೦೫ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

ಕಾವ್ಯ – ನಾಟಕ – ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ (ನವ್ಯ, ನವ್ಯೋತ್ತರ)

ಕಾವ್ಯ ಭಾಗ

೧. ಆದಿಮನ ಅನ್ನ ಸಮಸ್ಯ– ವಿನಾಯಕ

೨. ಚಿಂತಾಮಣಿಯಲಿ ಕಂಡಮುಖ– ಗೋಪಾಲಕೃಷ್ಣ ಅಡಿಗ

೩. ಅಸ್ತಮಾನ– ಜಿ. ಎಸ್. ಶಿವರುದ್ರಪ್ಪ

೪. ಸಾಧನೆ– ಚೆನ್ನವೀರ ಕಣವಿ

೫. ಶಿವನ ಮೀಸುವ ಹಾಡು– ವೈದೇಹಿ

೬. ಅವ್ವ– ಎಲ್. ಹನುಮಂತಯ್ಯ

೭. ಸತಿ ಹೋಗುವುದಿಲ್ಲ ನಾನು – ಸವಿತ ನಾಗಭೂಷಣ

೮.

ನಾಟಕ

೧. ಗೋಂದೋಳು– ಅಮೃತ ಸೋಮೇಶ್ವರ

ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ– ಎಲ್.ಎಸ್. ಶೇಷಗಿರಿ ರಾವ್

೧. ನವ್ಯ ಸಾಹಿತ್ಯ

೨. ದಲಿತ – ಬಂಡಾಯ ಸಾಹಿತ್ಯ

೩. ನವ್ಯ , ದಲಿತ, ಬಂಡಾಯ ಕಾಲಘಟ್ಟದ ಮಹಿಳಾ ಸಾಹಿತಿಗಳು

ಸೂಚನೆ: ಸಾಹಿತ್ಯ ಗಂಗೋತ್ರಿ– ೨ ಪಠ್ಯದ ಗದ್ಯಭಾಗವನ್ನು ಸಂಪೂರ್ಣ ಕೈಬಿಡಲಾಗಿದೆ.

ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024)

ಕನ್ನಡ ಐಚ್ಛಿಕ (ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ)

ಒಟ್ಟು 80 ಅಂಕಗಳು

ಪರೀಕ್ಷೆ: ೩ ಗಂಟೆಗಳು ಘಟಕ–೧ ಕಾವ್ಯ 30 ಅಂಕಗಳು

I ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ: 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

II ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 02x04=08
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

III ಮೂರಕ್ಕೆ ಸಂದರ್ಭ ಸ್ವಾರಸ್ಯ ಬರೆಯಿರಿ. 03x04=12
ಐದು ವಾಕ್ಯಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೨ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ 22 ಅಂಕಗಳು

IV ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

V ಮೂರು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 03x04=12
ಐದು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೩ ಕಥೆಗಳು 28 ಅಂಕಗಳು

VI ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

VII ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ 02x03=06
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

VIII ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 01x12=12
ಕಾವ್ಯ ಭಾಗದಿಂದ ೫ ಪ್ರಶ್ನೆಗಳು
ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಭಾಗದಿಂದ ಮೂರು ಪ್ರಶ್ನೆಗಳು
ನಾಟಕ ಭಾಗದಿಂದ ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳು

Annexure - 1

From,
Dr. Vasumathi Bhat,
Chairperson, Composite BOS in Sanskrit,
Mangalore University,
Mangalagangothri.

Date- 10-07-2024

To,
The Registrar (Academic)
Mangalore University,
Mangalagangothri.

RespectedSir,

Sub: Submission of Syllabus copy of Sanskrit Language for UG courses framed under SEP 2024). Ref: Your letter MU/Ku.Sa /Syndi/S5/9/2024-65555 Dated 09-07-2024.

With reference to the above subject, I am herewith submitting the syllabus copy of Sanskrit language for first and second semesters of all UG courses prepared by the Chairperson, Board members and a Special invitee for your approval. The syllabus is prepared according to the norms of State Education Policy 2024.

The proposed copy of syllabus is enclosed herewith for your kind persual and needful action.

Thanking you.

Yours Sincerely,

Dr. Vasumathi Bhat,
Chairperson, Composite BOS in Samskrit

Board Members and a Special Invitee (for BOS meeting) :

1. Dr. Vasumathi Bhat, — Chairperson
   Associate Professor,
   MGM College, Udupi - 2
2. Dr. Nagaraj B, — Member
   Associate Professor,
   Sridurga Samskrita Post Graduation Studies
   and Research center, Kateel, DK.

P.T.O.

3. Dr. Ramesh T S, Member
   Associate Professor,
   Poorna prajna College, Udupi.

4. Dr. Shreeshakumar M K, Member
   Assistant Professor,
   Sri Vivekananda College of Arts, Science and Commerce,
   Putturu, DK.

5. Sri Krishnaprasad K N, Member
   Principal,
   Srirama First Grade College, Kalladka, Bantwal, DK.

6. Prof. M.A. Shruthikeerthi Member
   Chairperson
   P.G. Studies of Sanskrit
   Kuvempu Universiry, Shimoga

7. Prof. Dr. Kumarasubrahmanya Bhat A., Special Invitee
   Dept. of Sanskrit
   University College, Hampanakatta Mangalore, DK.

MANGALORE UNIVERSITY

SYLLABUS FOR

UNDER GRADUATE PROGRAM (UG)

SANSKRIT LANGUAGE CURRICULUM FRAMEWORK

FRAMED ACCORDING TO THE STATE EDUCATION POLICY (SEP 2024)

(I& II SEMESTERS)

TO IMPLEMENT FROM THE ACADEMIC YEAR: 2024-25

FOR ALL COURSES

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY
MANGALAGANGOTHRI-574199

MANGALORE UNIVERSITY

Syllabus

For the year 2024-25 and onwards

Syllabus framed under State Education Policy-2024

SANSKRIT LANGUAGE

BA/BSW/BHRD/BVA/B.Sc/FND/BHS/BFD/

BID/BHM/BSA/BFT/BCS/B.Com/BCA/BBA

I&II semesters

Course pattern and scheme of examination for all U.G. Courses

CHAIR PERSON

BOARD OF STUDIES IN SANSKRIT

MANGALORE UNIVERSITY,

MANGALAGANGOTHRI-574199

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

I Semester: BA, BSW, BHRD and BVA

Sanskrit Language Paper-1
Title-Sanskrit Prose and Grammar — Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions – 40 Hours. 1. *Dharmaanushasanam* - 3 Hrs. 2. *Sagara katha* - 5 Hrs 3. *Saindhavaraaja garvaharanam* - 5 Hrs. 4. *Upaayam chintayeth praanjaha tatha apaayam cha* - 4 Hrs 5. *Shalyaparva* - 5 Hrs. 6. *Saagarollanghanam* - 5 Hrs. 7. *Simhaasanaprapthihi* - 4 Hrs. 8. *Kathaa chatustayam* - 6 Hrs. 9. *Vidyaya Vindathe Amrutam* - 3 Hrs.	65
2	Grammar - 8 Hours 1. Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice 4. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours- 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4= 08
5	Grammar (To be answered in Sanskrit only) *5.1* Choosing the right *Namapada* *5.2* Choosing the right *Sarvanamapada* *5.3* Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15x1=15
			Total Marks – 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Kriyapada* and Change of Voice.

Prescribed Textbook:

1. *Gadyasopanam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Divyaramayanam* - Swami Apoorvananda
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. *Bharathiyadarsana* - Dr. K. Krishnamurthy and Vid. N. Ranganatha Sharma

II Semester : BA, BSW, BHRD and BVA

Sanskrit Language Paper-2

Title – Sanskrit Poetry and Grammar

Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Subhashitani* - 5 Hrs. 2. *Guha samaagamaha* - 5 Hrs. 3. *Vande Guruparamparam* - 5 Hrs. 4. *Dwaadasha gathaaha* - 6 Hrs. 5. *Kalidasasya namrataa* - 4 Hrs. 6. *Chanakyaneetihi* - 5 Hrs. 7. *Chamatkaarashlokaaha* - 5 Hrs. 8. *Kaviprashamsa* - 5 Hrs.	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1) Identifying of *Samasa* 5.2) *Krudantha* 5.3) *Tadhitha* 5.4) *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya,* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Tadhitha* and *Samasa.*

Prescribed Textbook:

1. *Padyasopanam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) *Subhashitha Rathna Bhandagaram* - Enlarged and re-edited with sources etc by Rama Narayana Acharya '*Kavyatirtha*'

   (b)*Subhasithagalu* - Kannada Sahitya Parishath
2. a)*The Ramayana of Valmiki* - Wasudeva Laxmana Shastri Pansikar
   b) *Shreemad Valmikiramayanam* - Bharathadarshana Prakashana
   c) *Shreemad Valmikiramayanam* - Vidwan N. Ranganatha Sharma
3. *Raghuvamsha* - Mahakavyam of Mahakavi Kalidasa
4. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri
5. *Roopachandrika* - Choukhambha Sanskrit Pustakalaya

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

	I Semester: B.Com	
	Sanskrit Language Paper-1 Title – Sanskrit Prose and Grammar Maximum Marks:100	
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Acharyaanushasanam* - 3 Hrs. 2. *Seeta swayamvaraha* - 5 Hrs. 3. *Gadaayuddham* - 5 Hrs. 4. *Chandrabhoopatihi* - 5 Hrs. 5. *Rajyashreepraptihi* - 5 Hrs. 6. *Paramahamsopadeshaha* - 5 Hrs. 7. *Vineetaha Upamanyuhu* - 3 Hrs. 8. *Shantiparva* - 5 Hrs. 9. *Swargavarnanam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* 6. Identifying *Kriyapadas - Pancha Lakaras* 7. Change of Voice 8. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	5X2=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X 1= 15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Harshacharitha* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Shabdha Parichaya, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas* and Change of Voice.

Prescribed Textbook:

1. *Gadyavaibhavam*, Published by Mangalore University Sanskrit Teachers Association

Reference Books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. *Harshacharitam* - Banabhatta
6. *Nialakantavijaya Champu* - Nilakantadeekshitha

II Semester: B.Com

Sanskrit Language Paper-2

Title- Sanskrit Poetry and Grammar — Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Saduktikarnamrutam* - 6 Hrs 2. *Devaha Manusharoopena Charanti* - 5 Hrs 3. *Gurustavaha* - 4 Hrs 4. *Gathamahodadhihi* - 5 Hrs 5. *Parvatyaha Ugram Tapaha* - 6 Hrs 6. *Viduraneetihi* - 4 Hrs 7. *Chitrasamskrutam* - 6 Hrs 8. *Kavireva Prajapathihi* - 4 Hrs	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination

Duration of Examination – 3 Hrs. — **Max. Marks - 80**

1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Ramayana, Mahabharatha, Mahakavya,* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyavaibhavam,* Published by Mangalore University Sanskrit Teachers Association

Reference books:

1.	(a) *Subhashitha Rathna Bhandagaram*	-	Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
	(b) *Subhasithagalu*	-	Kannada Sahitya Parishath
2.	a) *The Ramayana of Valmiki*	-	Wasudeva Laxman Shastri Pansikar
	b) *Shreemad Valmikiramayanam*	-	Bharathadarshana Prakashana
	c) *Shreemad Valmikiramayanam*	-	Vidwan N. Ranganatha Sharma
3.	a) *Kumarasambhavam*	-	Mahakavyam of Mahakavi Kalidasa – Shesharaja Sharma
	b) *Kumarasambhavam*	-	Choukhambha Sanskrit Granthamala
1.	*Samskritha Vyakarana Sangraha*	-	Vidwan Bailooru Narayana Thantri

STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

I Semester: B.Sc/FND/BHS/BFD/BID/BHM/BSA/BFT/BCS

Sanskrit Language Paper-1
Title – Sanskrit Prose and Grammar
Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Taittiriyopanishadi Jeevanamoulyaam* - 3 Hrs. 2. *Jatayuprasangaha* - 5 Hrs. 3. *Ashwathamaa Hato Naro Va Kunjaro Va* - 5 Hrs. 4. *Apareekshya Na Kartavyam* - 5 Hrs. 5. *Gograhanam* - 5 Hrs. 6. *Narashimhapradurbhaavaha* - 4 Hrs. 7. *Kapinjalasyopadeshaha* - 5 Hrs 8. *Chikago Upanyasaha* - 4 Hrs. 9. *Shrividyaaranyaha* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice *4. Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X1=15
			Total Marks - 80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyaprasoonam,* Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. a) *Kadambari* - Dr. Bannanje Govindacharya
   b) *Kadambari* - Banabhatta
6. *Swami Vivekananda* - Ramakrishna Sharma

II Semester: B.Sc/FND/BHS/BFD/BID/BHM/BSA/BFT/BCS		
Sanskrit Language Paper-2 Title- Sanskrit Poetry and Grammar		Maximum Marks:100
1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Sooktimuktavalihi* - 6 Hrs. 2. *Satyaannasti Param Padam* - 5 Hrs. 3. *Tasmai Shri Gurave Namaha* - 4 Hrs. 4. *Sarasaaha Gathaaha* - 5 Hrs 5. *Indramanmathayoho Samvadaha* - 5 Hrs. 6. *Srikrishnaleelaha* - 5 Hrs. 7. *Chitrakavyam* - 6 Hrs. 8. *Mahakavishamsanam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15 x 1=15
			Total Marks-80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya, Chitrakavyam* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyaprasoonam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1.	(a) *Subhashitha Rathna Bhandagaram*	-	Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
	(b) *Subhasithagalu*	-	Kannada Sahitya Parishath
2.	a) *The Ramayana of Valmiki*	-	Wasudeva Laxmana Shastri Pansikar
	b) *Shreemad Valmikiramayanam*	-	Bharathadarshana Prakashana
	c) *Shreemad Valmikiramayanam*	-	Vidwan N. Ranganatha Sharma
3.	a) *Kumarasambhavam*	-	Mahakavyam of Mahakavi Kalidasa - Shesharaja Sharma
	b) *Kumarasambhavam*	-	Choukhambha Sanskrit Granthamala
4.	*Shrikrishnakarnamrutham*	-	Leelashukaha
5.	*Samskritha Vyakarana Sangraha*	-	Vidwan Bailooru Narayana Thantri

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

	I Semester: BBA	
	Sanskrit Language Paper-1 Title-Sanskrit Prose and Grammar Maximum Marks:100	
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Shishyopadeshaha* - 3 Hrs. 2. *Lankapuridahanam* - 5 Hrs. 3. *Paashupataastra Sampadanam* - 5 Hrs. 4. *Mandukaaha Sarpamadhirohanti* - 4 Hrs. 5. *Swargaarohanaparva* - 5 Hrs. 6. *Vaayasolookaanaam vairotpattihi* - 4 Hrs. 7. *Harisharmakathaa* - 4 Hrs. 8. *Gajendramokshaha* - 5 Hrs. 9. *Kathaachatushtayam* - 5 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas* and *Avyayas* 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only)	15out of 20	15X1=15
	5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* *5.3* Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*		Total Marks - 80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Mahakavyam* etc. to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyamoukthikam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Gadya Bharatam* - Shivadatta Thripathi
4. *Panchathantram* - Vishnusharma
5. *Bharathasangraha* - Lakshmanasoori
6. *Kumarasambhavam* - Kalidasa
7. *Harisharmakatha* - *Somadevana Kathasarithsagara*
8. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

II Semester: BBA		
	Sanskrit Language Paper-2 Title – Sanskrit Poetry and Grammar	Maximum Marks:100
1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours 1. *Subhashita Swarasyam* - 4 Hrs. 2. *Shri Sadaashivaanugraha* - 5 Hrs. 3. *Shriguruvandanam* - 4 Hrs. 4. *Gaathaavallari* - 6 Hrs. 5. *Dileepa Simhasamvadaha* - 6 Hrs. 6. *Vidhuropadishtani Moulyani* - 5 Hrs. 7. *Chaatukavyam* - 6 Hrs. 8. *Vande Kaviparamparaam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice 4. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyamoukthikam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. a) *SubhashithaRathnaBhandagaram* - Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
   b) *Subhasithagalu* - Kannada Sahitya Parishath
2. *Raghuvamshaha* - Kalidasa
3. *Shreemanmahabharatha* - Bharathadarshana Prakashana
4. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024 - 25 ONWARDS

I Semester : BCA

Sanskrit Language Paper-1
Title-Sanskrit Prose and Grammar
Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Snatakopadeshaha* - 4 Hrs. 2. *Shoorpanakha Naasaachedaha* - 5 Hrs. 3. *Yadaveeyakalaha* - 4 Hrs. 4. *Lobhaha Dhukasya Kaaranam* - 4 Hrs. 5. *Shukacharitam* - 5 Hrs. 6. *Shriraamaavataaraha* - 6 Hrs. 7. *Mahaashwetha saantvanam* - 5 Hrs. 8. *Baahubali vairaagyam* - 4 Hrs. 9. *Bhartruhari Nirvedaha* - 3 Hrs.	65
2	Grammar - 8 Hours. *1.* Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas and Avyayas* 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari, NeethiShatakam* etc. to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyachandrika*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Gadya Bharatam* - Shivadatta Thripathi
4. *Panchathantram* - Vishnusharma
5. a) *Kadambari* - Banabhatta
   b) *Banabhattana Kadambari* - Dr. Bannanje Govindacharya
6. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

II Semester: BCA

Sanskrit Language Paper-2
Title – Sanskrit Poetry and Grammar

Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Subhashitasudhaanidhihi* - 5 Hrs. 2. *Matsyavataaraha* - 5 Hrs. 3. *Nidhihi sarvavidyanaam* - 5 Hrs. 4. *Gathaamanjari* - 5 Hrs 5. *Kailase Vasantaprabhaavaha* - 6 Hrs. 6. *Koutilyaneethihi* - 5 Hrs. 7. *Shlokachamatkaaraha* - 5 Hrs. 8. *Shlaghyaha kavayaha* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice *4. Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours- 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *Karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya, Bhagavatha Purana* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyachandrika*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) *Subhashitha Rathna Bhandagaram* - Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
   (b) *Subhasithagalu* - Kannada Sahitya Parishath
2. *Shreemad Bhagavathamahapurana* - Bharathadarshana Prakashana
3. *Shreemanmahabharatha* - Bharathadarshana Prakashana
4. a) *Kumarasambhavam* - Mahakavyam of Mahakavi Kalidasa - Acharya Shesharaja Sharma
   b) *Kumarasambhavam* - Choukhambha Sanskrit Granthamala

Chairperson, BOS in Sanskrit
Mangalore University

MANGALORE UNIVERSITY

Sanskrit Optional Course

Five credits each

UNDER GRADUATE

BA

Syllabus framed under State Education policy - 2024

SYLLABUS

For the year 2024-2025 and onwards

I & II SEMESTERS

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199

I SEMESTER B.A SANSKRIT OPTIONAL
PAPER – I

Syllabus	Marks	Hours
1. Samskritha Saahitya Parichaya	15	9
2. Vyakarana Parichaya mattu Pravesha	45	27
3. Mahabharatha Yakshaprashne	30	18
4. 108 Subhashitaani (poorvardha)	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours- 4 per week Total Teaching Hours - 48 CREDITS - 3		

Scheme of Examination:			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.1	Main Question	1 out of 2	1X8 = 8
1.2	Explanation	2 out of 4	2X4 = 8
2.1	Fill in the Blanks	10 out of 15	10X1 =10
2.2	Write the Forms of words	2 out of 4	2X5= 10
2.2	Questions for Essay Type Answer	1 out of 2	1X8 = 8
2.3	Subject Explanation	1 out of 2	1X8 = 8
2.4	Short notes	2 out of 4	2X5 = 8
3.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
3.2	Story Writing	1 out of 2	1X8 = 8
3.3	Reference to context	3 out of 5	3X3 = 9
3.4	Answering the **Passage** Question	5 out of 5	5X1 = 5
4.1	Questions for Essay Type Answer	2 out of 3	2X4 = 8
4.2	Explanation of *Shlokas*	2 out of 3	2X4 = 8
4.3	Short notes	2 out of 4	2X4 = 8
4.4	Reference to context	2 out of 4	2X3 = 6
	Total		**120**

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Mahabharatha* and *Shubhashita* is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Saahitya Charitre*, Government Publication Bengalore.
2. *Sanskrit Kannada Swayam Shikshak / Vyakarana Pravesha*, Bailooru Narayana Tantri, Chowkhamba Publication.
3. *108 Subhashitani (Poorvardha),* Medha Publication.

II SEMESTER B.A SANSKRIT OPTIONAL

Syllabus	Marks	Hours
1. *Gadya, Katha Kaavya*	15	9
2. *Vyakarana Parichaya Mattu Pravesha*	15	9
3. *Laghu Siddhanta Koumudi - Samnja Prakarana*	30	18
4. *Kapinjala Upadeshaha*	30	18
5. *Panchatantra Kathaa (Raktamukha Vaanaraha, Dharmabuddhihi)*	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours- 6 per week Total Teaching Hours - 72 CREDITS - 3		

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.1	Main Question	1 out of 2	1X7 = 7
1.2	Explanation	2 out of 4	2X4 = 8
2.1	Answering in one word	5 out of 7	5X1 = 5
2.2	Verb and Noun	2 out of 4	2X5 = 10
3.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
3.2	Explanation of *Sootra*	2 out of 4	2X4 = 8
3.3	Short notes	2 out of 4	2X4 = 8
3.4	*Samjna Sootra* Writing	3 out of 5	3X2 = 6
4.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
4.1	Explanation of *Shlokas*	2 out of 3	2X4 = 8
4.2	Short notes	2 out of 4	2X4 = 8
4.3	Reference to context	2 out of 4	2X3 = 6
5.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
5.2	Explanation of *Gadya*	2 out of 3	2X4 = 8
5.3	Short Notes	2 out of 4	2X4 = 8
5.4	Reference to context	2 out of 4	2X 3 = 6
	Total		**120**

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Panchatantra* and Prose Literature is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Saahitya Charitre*, Government Publication Bengalore.
2. *Sanskrit Kannada Swayam Shikshak / Vyakarana Pravesha*, Bailooru Narayana Thantri, Chowkhamba Publication.
3. *Laghu Siddhanta Ko*[i]*umudi*, Chowkamba Publication.

Programme Strcture of B.A. Political Science

SL NO	Course Code	Title of the Course	Category of the Course	Teaching Hours / Week	Sem. Exam	IA	Total Marks	Credits
Semester I								
1		Key concepts in Political Science	Theory	6	80	20	100	5
Semester II								
3		Western Political Thought	Theory	6	80	20	100	5

Course Title – Key concepts in Political Science

Semester – I

Course credits – 5

Number of teaching Hours per week – 6

Total Contact Hours – 72

Summative Assessment Marks- 80 + 20 (IA) = 100

Course Objectives:

1. To introduce students to the basic principles and concepts of Political Science.
2. To enable students to develop a sensitive and broader vision of politics.
3. To cultivate critical thinking and analytical skills among students while evaluating political issues.
4. To empower students to become informed and responsible citizens.
5. To apply political science concepts to contemporary issues and events.

Learning Outcomes:

At the end of the course the student will,

1. Understand the basic principles and concepts of Political science.
2. Develop a sensitive and broader vision of politics based on the nuanced understanding of political principles and concepts.
3. Demonstrate critical thinking and analytical skills in comprehension and evaluation of political issues.
4. Be able to become informed and responsible citizens.
5. Be able to apply political science concepts to contemporary issues and events.

Pedagogy: Lectures, interactive sessions, practical exercises, assignments, seminars and group discussions.

Key concepts in Political Science

Unit 1: Introduction (16 hrs.)

1.1 Political Science: Meaning, nature and the importance of the study
1.2 Approaches: Traditional and Modern (Behavioural and Systems)
1.3 Constructivism and Post colonialism
1.4 Political Science in India

Unit 2: State and Society (18 hrs.)

2.1 Power and Authority – Meaning and kinds; Law – Meaning and importance
2.2 State: Meaning,elements and Evolution; State and globalisation
2.3 Perspectives on State – Liberal and Marxist; Concept of welfare state
2.4 Civil Society- Meaning and importance; State and civil society

Unit 3: State and Constitutional values (18 hrs.)

3.1 Sovereignty- Meaning and importance; Monistic and pluralist theory
3.2 Rights – Meaning, nature and importance; Rights and duties
3.3 Liberty and Equality – Meaning and kinds
3.4 Justice – Meaning and dimensions; Concept of Social Justice

Unit 4: State and Politics (20 hrs.)

4.1 Citizenship – Meaning; Political obligation – Meaning and significance
4.2 Democracy- Meaning and importance, Participatory democracy
4.3 State and government; Forms of government – Democracy and authoritarian, Parliamentary and Presidential, Unitary and federal
4.4 Political culture and socialisation; Political participation- Meaning and kinds; Political parties – Meaning, functions and kinds.

Suggested Readings:

1. Amal Ray and MohitBattacharya, *PoliticalTheory ideas and Institutions*, Kolkata, The World Press Pvt. Limited, 2013.
2. M. J. Vinod and Meena Deshpande, *Contemporary Political Theory*, Delhi, PHI Learning, 2013.
3. S. Ramaswamy, *Political Theory Ideas and Concepts*, Delhi, Macmillan, 2002.
4. VidyaBhushan, Vishnu Bhagvan, *Principle of Political Science*, New Delhi, S. Chand and Co, 1998.
5. A. C. Kapur, *Principles of Political Science*, Delhi, S. Chand and Co, 2010.
6. Anup Chand Kapur, *Principles of Political Science*, Delhi; S Chand & Co,2010
7. N.N. Agarwal, VidyaBhushan and VishnooBhawan, R., *Principles of Political Science*, New Delhi; S. Chand & Co.,1998.
8. Atlantic Research Division, *Political Theory Concepts and Debates*, New Delhi; Atlantic Pub., 2021
9. S. N Dubey, *Political Science Theory*, Agra, Lakshmi Narain Agarwal, 2002.
10. O.P. Gauba, *An Introduction to Political Theory*, Delhi; National Publishing House, 2019
11. Eddy Asirvatham and K KMisra, *Political Theory*, Delhi; S. Chand& Co., 2010

Course Title – Western Political Thought

Semester – II

Course credits – 5

Number of teaching Hours per week – 6

Total Contact Hours – 72

Summative Assessment Marks- 80 + 20 (IA) = 100

Course Objectives:

1. To familiarize students with western foundations of Political Thought and to critically engage with the rational/material universe of the west.
2. To identify and analyse key political ideas and evaluate the continuity and changes in Western Political Thought.
3. To evaluate the role of Western Political Thought in shaping modern political systems, institutions and policies.
4. To cultivate among students an appreciation for the diversity and value of political perspectives and traditions.
5. To explore the impact of historical events and cultural context on political ideas and the relevance of western political thinking to evaluate contemporary issues.

Learning Outcomes:

At the end of the course the students will,

1. Have an understanding of the distinct features and diverse intellectual traditions of the west.
2. Be able to identify the main currents in Western Political Thought and their impact on the shaping of western political values and institutions.
3. Develop a critical perspective on the impact of Western Political Thought on the political system, governance and political order.
4. Be able to appreciate the diversity and value of divergent political perspectives and traditions.
5. Be able to identify the background of political ideas and relevance of Western Political Thought to evaluate the contemporary political issues.

Pedagogy: Lectures, Interactive Sessions, Practical exercise, Assignments, Seminars and Group discussion.

Western Political Thought

Unit1: Introduction and Greek political thought (18 hrs.)

1.1 Political thought – Meaning and significance
1.2 Greek political thought - Features; Socrates on Law and state
1.3 Plato on Ideal state and Justice
1.4 Aristotle on classification of governments, citizenship and revolution

Unit 2: Medieval and early modern political thought (18 hrs.)

2.1 Salient features of early modern political thought
2.2 Church-state controversy; St. Augustine – Theory of two swords
2.3 St. Thomas Aquinas- Natural law and theory of government
2.4 Niccolo Machiavelli – Political realism

Unit 3: Contractualists, Liberals and Utilitarians (18 hrs.)

3.1 Thomas Hobbes – Absolute sovereignty, state and society
3.2 John Locke – Theory of natural rights and limited government
3.3 Jean Jacques Rousseau – Social contract, General will and popular sovereignty
3.4 Jeremy Bentham – Utilitarianism; J.S. Mill – Utilitarianism, Liberty and Representative Government

Unit 4: Nature of state: Idealism and Marxism (18 hrs.)

4.1 T.H. Green – State and freedom; Immanuel Kant – Moral philosophy
4.2 G.W.F. Hegel - Dialectics
4.3 Karl Marx- Historical materialism and communism
4.4 Antonio Gramsci – Hegemony; John Rawls – Theory of Justice

Suggested Reading:

1. G. H. Sabine, *A History of Political Theory 4thed*, New Delhi, Oxford and IBH, 2019.
2. William Ebenstein, *Great Political Thinkers Plato to the Present*, Holt, Rinehart and company, 1963.
3. SubratoMukherji and SusheelaRamaswamy, *History of Political Thought Plato to Marx*, New Delhi, PHI Publishers, 2014.
4. Sukhbir Singh, *History of Political Thought Vol 1 & Vol 2, Meerut*, Rastogi Publishers, 2006.
5. Coleman. J A *History of Political Thought*, Oxford, Blackwell, 2000.
6. Boucher, D., and Kely, P., ed., *Political Thinkers From Socrates to the Present*, Oxford: Oxford University Press, 2009
7. C.L. Wayper. *Political Thought*, Bombay: B.I. Publications,1977.
8. Quentin Skinner, *The Foundations of Modern Political Thought*, Cambridge: OUP,1978
9. Ernest Barker, *Greek Political Theory: Plato and his Predecessors*, London: Metheun& Co., 1970.
10. M.J. Vinod and Meena Deshpande, *Contemporary Political Theory*, Delhi: PHI Learning, 2013
11. L. Colleti,*From Rousseau to Lenin*, New Delhi: Oxford University Press,1969.
12. Colin Farrelly, *Introduction to Contemporary Political Theory*, London, Sage, 2004
13. Robert E. Goodin, Philip Pettit and Thomas Pogge, eds., *Companion to Contemporary Political Philosophy*, Oxford, Blackwell, 2007

Question paper pattern

POLITICAL SCIENCE

B.A. ---- Semester Examination, 20--

Course Code and Title

Section – A (4 x5= 20)

Instructions:

- Write short notes on any **four** of the following, each not exceeding 200 words.
- All questions carry equal marks

1.
2.
3.
4.
5.
6.

Section – B (4 x15= 60)

Instructions:

- Answer any **four** of the following, each not exceeding 600 words.
- All questions carry equal marks

7.
8.
9.
10.
11.
12.

MANGALORE UNIVERSITY
Suggested programme structure for the Under Graduate Programmes
Bachelor of Science (B. Sc.)

Semester	*Course 1	*Course 2	*Course 3	**Elective / Optional	Course	***Languages	****Compulsory	Total Credit	Total working hour
I	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)			3+3	2	23	4+4+4+4+4+4+4+4+2 = 34
II	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)			3+3	2	23	4+4+4+4+4+4+4+4+2 = 34
III	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2		3+3		23	4+4+4+4+4+4+4+2+4+4=34
IV	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2		3+3	2	25	4+4+4+4+4+4+4+2+4+4+2=36
V	8 [(2x3T) +2P]	8[(2x3T)+2P]	8 [(2x3T) +2P]				2	26	3+3+4+3+3+4+3+3+4+2=32
VI	8 [(2x3T) +2P]	8 [(2x3T) +2P]	8 [(2x3T) +2P]				2	26	3+3+4+3+3+4+3+3+4+2=32
								146	**202**

Note:
* Course 1 / * Course 2 / * Course 3: I to IV semesters Theory:3 credit = 4 contact hours &Practicals:2 credit = 4 contact hours
* Course 1 / * Course 2 / * Course 3: V to VI semesters Theory:3 credit = 3 contact hours &Practicals:2 credit = 4 contact hours
**Elective / Optional: 2 credit = 2 contact hours
***Languages: 3 credit = 4 contact hours
****Compulsory: 2 credit = 2 contact hours

MANGALORE UNIVERSITY
BSC SEP 2024
COURSE PATTERN AND SCHEME OF EXAMINATION
CORE SUBJECT: PHYSICS

Core/ Elective	Course Code	Title	Instruction / h /Week	Duration of the Exam(h)	Max. Marks			Credits
					IA	Exam	Total	
I Semester								
Core Subject		Mechanics & properties of matter	4	3	20	80	100	3
		Physics Practicals- I	4	3	10	40	50	2
Total Number of Credits for Core Subject (Physics) in I Semester: 5								
II Semester								
Core Subject		Acoustics, Relativity and Thermal Physics	4	3	20	80	100	3
		Physics Practical's-II	4	3	10	40	50	2
Total Number of Credits for Core Subject (Physics) in II Semester: 5								
III Semester								
Core Subject		Optics	4	3	20	80	100	3
		Physics Practicals -III	4	3	10	40	50	2
Discipline Elective optional		Astrophysics- Space mission	2	2	10	40	50	2
Total Number of Credits for Core subject (Physics) in III Semester: 5 Discipline elective: 02								
IV Semester								
Core Subject		Electricity	4	3	20	80	100	3
		Physics Practical's IV	4	3	10	40	50	2
Discipline Elective optional		Medical instrumentation / Energy sources	2	2	10	40	50	2
Compulsory Skill/ Practicals	BSCPHSS254	Optical/Electrical/ Electronic Instrumentation/ Any other field	2	Viva-voce	10	40	50	2
Total Number of Credits for Core subject (Physics) in III Semester: 5 Discipline elect. Opt.: 2 Compulsory skill / practical: 2								
V Semester								
Core Subject		Quantum Mechanics & Spectroscopy	3	3	20	80	100	3
		CMP & Semiconductor Physics	3	3	20	80	100	3
		Physics Practicals V	4	3	20	80	100	2
Total Number of Credits for Core Subject (Physics) in V Semester: 8								
VI Semester								
Core Subject		Nuclear Physics & Elementary Particles	3	3	20	80	100	3
		Electronics	3	3	20	80	100	3
		Physics Practicals VI	4	3	20	80	100	2
Total Number of Credits for Core Subject in VI Semester: 8								
Total number of Credits for Core Subject (Physics) from I - VI Semesters: 36 Discipline elective: 4 Compulsory skill / practical: 2								

Note: The theory IA will be based on the average of two internal tests or activities. The Practical IA will be based on regular performance and one model test.

Mangalore University
SEP 2024 BSC Physics syllabus structure

B Sc I Semester	**B Sc II Semester**
➢ Paper Title: Mechanics& properties of matter ➢ Paper Code: BSCPHST101 ➢ Unit distributions: Unit 1: review of vectors, Newtonian mechanics, gravitation Unit 2: Rotation dynamics, rigid body mechanics Unit 3: Properties of matter, elasticity Unit 4: Fluid Mechanics ➢ Practical title: Physics practical I ➢ Practical Code: BSCPHSP102	Paper Title: Acoustics, Relativity and Thermal Physics ➢ Paper Code: BSCPHST151 ➢ Unit distributions: Unit 1: Acoustics, Fourier theorem Unit 2: Relativity Unit 3: Thermal Physics Unit 4: Thermal radiation ➢ Practical title: Physics practical II ➢ Practical Code: BSCPHSP152
B Sc III Semester	**B Sc IV Semester**
➢ Paper Title: Optics ➢ Paper Code: BSCPHST201 ➢ Unit distributions: Unit 1: Review of theories of light, Interference Unit 2: Diffraction Unit 3: Polarization Unit 4: Electromagnetic theory ➢ Practical title: Physics practical III ➢ Practical code: BSCPHSP202	➢ Paper Title: Electricity ➢ Paper Code: BSCPHST251 ➢ Unit distributions: Unit 1: Network elements& theorems Unit 2: Alternating current circuits and filters Unit 3: Transients, electrical measurements & dielectrics Unit 4: Thermo electricity & power transmission ➢ Practical title: Physics practical IV ➢ Practical Code: BSCPHSP252
B Sc V Semester (2 papers)	**B Sc VI Semester**(2 papers)
➢ **Paper 1 title**: Quantum mechanics& Spectroscopy ➢ Paper code: BSCPHST301 ➢ Unit distributions: Unit 1: Development of Quantum mechanics Unit 2: Quantum Mechanics Unit 3: Atomic Models & Spectra Unit 4: Molecular Spectra, Scattering, LASER ➢ **Paper 2 title**: Condensed matter Physics & Semiconductor devices ➢ Paper code: BSCPHST302 ➢ Unit distributions: Unit 1: Statistical Physics, specific heat of solids &nano materials Unit 2: X – rays, Crystallography & Super conductivity Unit 3: Free electron theory of metals Unit 4: Semiconductor Physics ➢ Practical title: Physics practical V ➢ Practical Code: BSCPHSP303	➢ **Paper 1 title**: Nuclear Physics & elementary particles ➢ Paper code: BSCPHST351 ➢ Unit distributions: Unit 1: Nuclear properties, radioactivity Unit 2: Nuclear decay& spectra of nuclear radiation Unit 3: Nuclear force, nuclear reaction and nuclear reactors Unit 4: Particle accelerators & detectors, fundamental particles ➢ **Paper 2 title**: Electronics ➢ Paper code: BSCPHST352 ➢ Unit distributions: Unit 1: Semiconductor devices Unit 2: OPAMP Unit 3: Regulated Power Supply & Communication Electronics Unit 4: Digital Electronics ➢ Practical title: Physics practical VI ➢ Practical Code: BSCPHSP353

B Sc III Semester Discipline Elective optional	**B ScIV Semester Discipline Elective optional**
➢ Paper Title: Astrophysics- Space mission ➢ Paper Code: BSCPHSE203	Paper Title: Medical instrumentation / Energy sources ➢ PaperCode: BSCPHSE253

B Sc IV Semester compulsory skill/ practicals

- Paper Title: Optical /Electrical / Electronicinstrumentation/Any other field
- Paper Code: BSCPHSS253
- Objective: Departmental internship to enhance students' skills.

MANGALORE UNIVERSITY
SYLLABUS FOR BSc PHYSICS SEP 2024
Semester – I

Program Name	B Sc in Physics	Semester	I
Course Title	**Mechanics and Properties of matter**		
Course Code	BSCPHST101	**No. of Credits**	03
Contact Hours	52 (4 hours per week)	**Duration of SEA/ Exam**	03 h
Formative Assessment Marks	20	**Summative Assessment Marks**	80

Program Outcomes (PO):

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)		**Program outcomes (POs)**					
At the end of the course students will be able to:		**PO- 1**	**PO- 2**	**PO- 3**	**PO-4**	**PO- 5**	**PO- 6**
i.	Estimate the possible error in measurement of a physical quantity, using its dimensional equation, the least counts of instruments used and by actual measurements in the appropriate system of units.	**X**	**X**	**X**		**X**	**X**
ii	Knowledge of newton's motion of bodies and gravitation and satellite motion	**X**	**X**	**X**			**X**
iii.	Apply laws of conservation of momentum and associated energy along with laws to motion to the systems of linear/rotational motion to determine different parameters associated with physically rigid bodies.	**X**	**X**	**X**			**x**
iv.	Capable of determining various elastic moduli of materials.	**X**	**X**	**X**		**X**	**X**
v.	Apply the concept of rotational dynamics and simple harmonic motion in various applications.	**X**	**X**	**X**	**X**		**X**
vi	Explain bending of beams and use of torsion pendulum in the determination of various physical parameters.	**X**	**X**	**X**			**X**
vii	Measure surface tension and factors affecting surface tension of liquids and hence measurement of viscosity liquids.	**X**	**X**		**X**		**X**

I Semester B Sc Physics Syllabus

Paper: Mechanics and Properties of matter	Duration

UNIT - I	**Mechanics:** Units and dimensions, Review of scalars and vectors. Derivative of a planar vector of constant magnitude but changing direction. Deduction of the results of uniform circular motion. Problems. (4h) Review of Newtonian mechanics: Newton's laws of motion, Concepts of inertia, force, momentum and energy. Gravitation (2 h) Conservation laws – linear and angular momentum and energy with examples, circular motion –central forces, centripetal and centrifugal forces with examples. Planetary motion- orbital motion, Kepler's laws (derivation). - Projectile motion with examples - escape velocity. Satellite motion, rockets, single and multistage rockets- rocket fuel, rocket shape,time period of the satellite, different types of satellites, shapes of the orbitsof satellites motion.Launching of satellites, re-entry problems.Problems. (7h)	13 h
UNIT – II	**Rigid body mechanics:** Moment of inertia and radius of gyration. Theorems of moment of inertia – parallel and perpendicular axes theorems with proof. Calculation of MI of regular and irregular shaped bodies - rectangular lamina, thin rod, circular disc (about different axes). Problems. (7 h) **SHM**: Review of simple pendulum, Vertical oscillations of the light loaded spring, expression for force constant. Problems. (2 h) **Theory of compound pendulum**: Expression for time period. Reversibility of centre of oscillation and centre of suspension. Bar pendulum, determination of g and K. Problems. (4 h)	13 h
UNIT - III	**Elasticity**: Definition for elasticity, stress and strain, elastic limit, Hooke's law, stress – strain diagram, Elastic constants q, k and n - definition (Mention of practical applications) Derivation of the relation connecting the elastic constants. Poisson's ratio – definition and derivation of limiting values (Mention of practical applications). Work done in stretching a wire, work done during twisting a wire, Derivation of expression for twisting couple on a cylinder.(7 h) **Bending of beams**: Explanation, explanation of uniform and non- uniform bending with examples, definition for bending moment, derivation of the expression for bending moment, cantilever bending explanation with examples, Expression for the depression produced at the loaded end of light cantilever.I-section Girders. (Mention of practical applications). Problems.(6 h)	13h
UNIT - IV	**Fluid dynamics:** Review of fluids and its properties with examples**.** Streamline flow, turbulent flow (examples) - critical velocity, Equation of continuity, Bernoulli's principle and its applications. (2 h) **Surface tension**: Attractive forces in a liquid –forces on the surface of a liquid- Definition of surface tension, molecular theory of surface tension - Surface energy, relation between surface tension and surface energy, illustrations of surface tension - pressure difference across curved surface- examples, excess pressure inside spherical liquid drop, discussion of angle of contact- special cases, Surface tension by drop weight method, factors affecting surface tension; Interfacial surface tension –determination interfacial tension by drop weight method.Problems. (6 h) **Viscosity:** Coefficient of viscosity – importance of viscosity with examples - determination of coefficient of viscosity by Poisulle's method (derivation) –terminal velocity- importance of terminal velocity -Stoke's law – Stoke's method for the determination of coefficient of viscosity (derivation), (Mention of practical applications). Problems. (5 h)	13h

Text Books:

1. Mechanics by, D. S. Mathur (S. Chand & Co.)
2. Mechanics and Relativity, 3rd Edition by Vidwan Singh Soni (PHI Learning Pvt. Ltd.)
3. Mechanics Berkeley Physics Course, Vol.1 by Charles Kittel, et.al. (Tata McGraw-Hill)
4. Physics for Degree Students by CL Aurora & PS Hemne (S. Chand & Co)
5. Mechanics by J C Upadhyaya (Himalaya Publishing House)
6. A Treatise on Heat by MeghnadSaha, and B. N. Srivastava, (Indian Press)
7. Heat, Thermodynamics and Statistical Physics by Brij Lal, Subrahmanyam and Hemne (S. Chand & Co.)

Reference Books:

1. Principles of Physics 9th Edition by Resnick, Halliday & Walker (Wiley)

2. Introduction to Special Theory of Relativity by Robert Resnick (Wiley Student Edition)
3. Physics for Scientists and Engineers by Jewett &Serway (Cengage learning India Pvt Ltd, Delhi)
4. The Feynman Lectures on Physics – Vol 1 by Richard P Feynman, Robert B Leighton, Mathew Sands, (Narosa Publishing House)
5. Concepts of Modern Physics by Arthur Beiser (Tata McGraw Hill)
6. Modern Physics by Kenneth Krane (Wiley)
7. Newtonian Mechanics by AP French (Viva Books)
8. Modern Physics by G Aruldhas& P Rajagopal (PHI Learning Pvt. Ltd)

List of experiments to be performed in the laboratory:

A minimum of 8 experimentsneed to be carried out in the laboratory. (4 h per week)

1	Verification of parallel and perpendicular axis theorems.
2	Determination of MI and mass of Fly Wheel.
3	Law of conservation of linear momentum by collision in two dimensions.
4	Determination of g and K using bar pendulum (two-hole method and h - T graph).
5	Determination of g by spiral spring.
6	Uniform bending – measurement of q
7	Torsion Pendulum –moment of inertia of irregular body.
8	Acceleration due to gravity, from the $L - T^2$ graph, for a simple pendulum.
9	Effect of mass of the bob on the time period of the simple pendulum.
10	Effect of amplitude of oscillation on the time period of the simple pendulum.
11	Inclined plane – Dependence of downward force on angle of inclination.
12	Cantilever bending – Determination of q.
13	Surface tension by drop weight method.
14	Rigidity modulus using torsion pendulum.
15	Determination of q by Koenig's Method.
16	Interfacial tension between water and kerosine.
17	Searle's double bar – determination of q, n and σ.
18	Rigidity modulus by static Torsion.
19	Viscosity by Stoke's method.
20	Viscosity by Poiseuille's method
21	Viscosity by Oswald Viscometer
22	Determination of q by stretching of wire.

Reference Books for Laboratory Experiments:

1. Advanced Practical Physics for students by B.L. Flint and H.T. Worsnop (Asia Publishing House.)
2. A Text Book of Practical Physics by I. Prakash & Ramakrishna, 11th Edition (Kitab Mahal)
3. Advanced level Physics Practicals by Michael Nelson and Jon M. Ogborn 4th Edition (Heinemann Educational Publishers)
4. A Laboratory Manual of Physics for undergraduate classes by D. P. Khandelwal (Vani Publications).
5. BSc Practical Physics Revised Ed by CL Arora (S. Chand & Co)
6. An advanced course in practical physics by D. Chattopadhyay, PC Rakshit, B. Saha (New Central Book Agency Pvt Ltd)

Suggested Activities		
Mechanics I		
Activity 1	Takedifferentobjectsofregularshape,writethedimensionalequationfor their volume, surfacearea andwritetheirunitsinSIand CGSsystems.Forthe Abovecalculatetheactualvolumeandsurfaceareausingrelevant measuring tools.	
Activity 2	Drop balls of different hardness on different surfaces and list them in order of their energy absorption and give reasons.	
Activity 3	Students can try and understand conservation of energy in every day with examples.	

	For example: i) What happens in solar conservation panels ii) Pushing an object on the table it moves iii) Moving car hits a parked car causes parked car to move. In these cases, energy is conserved. How? Understand and verify them. Students can try and understand conservation of momentum with help of coins and balls by referring to websites.	
Activity 4	Prepare and present a report on different types of Geo Satellite orbits and their characteristics	
Mechanics-II		
Activity 1	Devisean experiment that demonstrates that the variation in the distribution of mass in a rotating body affects the rotating speed. Plot a graph of the variation in the position of mass with the centre of the body and the average speed of rotation.	
Activity 2	Moment of inertia is an abstract concept. It simply gives a measure of rotational inertia of a rigid body and it is proportional to the product of the square of radius, r of the body and its mass, m. Students by Referring to websites, students can construct and perform simple experiments to verify that MI α mr^2. Students can try to understand law of inertial with the help of coins and balloons by referring to websites. Reference: www.khanacademy.org, www.pinterest.com, www.serc.cerleton.edn, https://www.youtube.com	
Activity 3	Prepare suitable charts and give seminar talks related to moment of inertia, gravitation and planetary motion.	
Activity 4	Rolling of different disc and cylinders on inclined plane to understand the moment of inertia. (ii) Listing and discussing the moment of inertia of bodies come across in daily life.	
Surface tension and viscosity		
Activity 1	Measure surface tension of water and other common liquids and compare and learn i) Why water has high ST? think of reasons. ii) Check whether ST is a function of temperature? You can do it by heating the water to different temperatures and measure ST. iii) Plot ST versus T and learn how it behaves. Mix some quantity of kerosene or any oil to water and measure ST. Check whether ST for the mixture is more or less than pure water. List the reasons.	
Activity 2	Collect a set of different liquids and measure their viscosity. i) Find out whether sticky or non-sticky liquids are most viscous. List the reasons. ii) Mix non sticky liquid to the sticky liquid in defined quantities and measure viscosity. Find out viscosity is increasing or decreasing with increase of non-sticky liquid concentration. iii) Do the above experiment by mixing sticky liquid to the non-sticky liquid. Find out change in viscosity with increase of concentration of sticky liquid. List the applications where concept of Viscosity plays a dominant role.	
Elasticity		
Activity 1	Arrange a steel spring with its top fixed with a rigid support on a wall and a meter scale alongside. Add 100 g load at a time on the bottom of the hanger in steps. This means that while putting each 100g load, we are increasing the stretching force by 1N. Measure the extension for loads up to 500g. Plot a graph of extension versus load. Shape of the graph should be a straight line indicating that the ratio of load to extension is constant. Go for higher loads and find out elastic limit of the material.	
Activity 2	Repeat the above experiment with rubber and other materials and find out what happens after exceeding elastic limit. Plot and interpret	
Activity 3	Classify different materials into elastic and plastic materials. Study the bending magnitudes of different shape and material rods.	

SYLLABUS FOR BSc PHYSICS SEP 2024
Semester – II

Program Name	*B Sc in Physics*	*Semester*	*II*
Course Title	**Acoustics , Relativity and Thermal Physics**		
Course Code	*BSCPHYC151*	***No. of Credits***	*03*
Contact Hours	*52* (4 h per week)	***Duration of SEA/ Exam***	*03 hours*
Formative Assessment Marks	*20*	***Summative Assessment Marks***	*80*

Program Outcomes (POs)

PO-1: Discipline Knowledge: Knowledge of science and ability to apply to relevant areas.

PO-2: Problem solving: Execute a solution process using first principles of science to solve problems related to respective discipline.

PO-3: Modern tool usage: Use a modern scientific, engineering and IT tool or technique for solving problems in the areas of their discipline.

PO-4: Ethics: Apply the professional ethics and norms in respective discipline.

PO-5: Individual and teamwork: Work effectively as an individual as a team member in a multidisciplinary team.

PO-6: Communication: Communicate effectively with the stake holders, and give and receive clear instructions.

Course Learning Outcomes (CO)	**Program Outcomes (POs)**					
At the end of the course students will be able to:	**PO- 1**	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**
CO-1:Apply the concept of the relative motion of frame of reference with appropriate postulates of the theory of relative motion to the measurement of length, time, mass, energy and velocity.	**X**	**X**	**X**			**X**
CO-2:Apply the laws of thermodynamics and concept of heat engine to various observations.	**X**	**X**	**X**	**X**	**X**	**X**
CO-3: Explain fundamental laws of black body spectrum.	**X**	**X**	**X**	**X**	**X**	**X**
CO-4: Explain free, damped and forced oscillations, progressive waves & Fourier analysis of square wave.	**X**	**X**			**X**	**X**

Semester – II

Paper: Acoustics, Relativity and Thermal Physics		Duration
UNIT - I	**Waves & Oscillations** **Oscillations**: Review of harmonic oscillations (examples) Equation for a harmonic oscillator. Free oscillations and damped oscillations (practical examples and usages). Setting up of equation for forced oscillations and its solution, condition for resonance. Problems. (4 h) **Waves**: Review of waves -Different types of waves(examples), Equation for a progressive wave in one dimension. Differential equation of wave motion, characterization of simple harmonic waves (frequency, wavelength, amplitude, phase, etc. both in graphical and mathematical), applications of waves. Propagation of waves: a) Longitudinal waves:i) Through fluid - Expression for velocity of longitudinal waves (derivation) – examples - Newton`s formula for velocity of sound in air and Laplace correction. ii) Through solid -Vibrations in a rod. b) Transverse waves:transverse waves (examples) Velocity of transverse vibrations in a	13 h

	string (derivation). Expression for fundamental frequency and overtones (examples). Problems. (6 h) **Fourier's theorem**: Statement and explanation– expression for Fourier coefficients (exponential form). Limitations of Fourier theorem. Mathematical analysis of a square wave(examples). Problems. (3 h)	
UNIT - II	**Relativity:** **Frame of reference:**Inertial and non - inertial frames (examples**).** Galilean principle of relativity,Galilean transformation equation. space and time invariance,velocity addition theorem in inertial frames. Concept of fictitious forces with examples. Problems.(4 h) **Concept of absolute frame of reference**:Ether hypothesis. Velocity of light and failure of Galilean concepts.(2 h) **Special theory of relativity**: Postulates of special theory of relativity. Lorentz transformation (no derivation). Length contraction. Relativity of simultaneity. Time dilation- Twin paradox, Relativistic mass (mention), velocity addition theorem. Einstein's mass energy equivalence- (derivation based on photon gun experiment). Relativistic expression for kinetic energy. Relation between energy and momentum. Rest mass of the photon. Problems. (7 h)	13 h
UNIT - III	**Thermal Physics:** Review of gas laws (equation), energy temperature relation.Types of thermal processes. Isothermal, adiabatic, reversible and irreversible (examples). Expression for work done during isothermal and adiabatic processes(examples). Problems. (3h) I law of thermodynamics. Carnot's engine: Carnot's cycle. Efficiency of Carnot's engine. Reversibility of Carnot's engine(mention of practical engines). Refrigerator (principle only), Coefficient of performance. Derivation of Clausius - Clapeyron first latent heat equation and applications. II law of thermodynamics: Kelvin's and Clausius Statements(mention of practicalexamples). Problems. (7 h) **Entropy**: Change in entropy during isothermal, adiabatic, reversible and irreversible processes(examples). T-S diagram of Carnot's cycle. Problems. (3 h)	13 h
UNIT - IV	**Low temperature Physics**: Ideal and real gases, liquefaction of gases(examples).Results of Andrews experiment. Joule - Thomson Effect, J - Tporous plug experiment: Boyle temperature, inversion temperature and critical temperature - relation. Adiabatic demagnetization. Cryogenics. Measurements of low temperature. Problems. (5h) **Radiation**: Concept of black body, Blackbody radiation, energy distribution in a black body radiation. Wien's displacement law, Stefan-Boltzmann law, Wien's distribution law and Rayleigh-Jeans law. Planks hypothesis of radiation, Planks explanation of black body radiation. Derivation of Planck's law of black body radiation. Deduction of Wien's distribution law,Rayleigh-Jeans lawfromPlanck's law. Problems. (8 h)	13 h

References books:

1. Fundamentals of Physics by Halliday Resnik and Walker,Wiley publications
2. Mechanics by D S Mathur S Chand publication
3. Properties of matter By Brijlal and Subramanyam, S Chand publication
4. Physics for degree students By C L Arora and P S Hemne, S Chand publication
5. College physics by N Sundarrajan:United publisher
6. Mechanics by J C Upadhyaya Himalaya publishing house Pvt Ltd.
7. Modern Physics by R Murugeshan and KiruthigaSivaprasath. S Chand publication.

List of Experiments to be performed in the Laboratory:
A minimum of 8 experiments need to be carried out in the laboratory. (4 hours per week)

1	Velocity of sound using sonometer.
2	Frequency of ac using sonometer.
3	Study of Lissajous figures.
4	Frequency of AC by Melde's experiment
5	Specific heat of liquid by cooling.
6	Specific heat of liquid by electrical method.
7	Specific heat of a solid.
8	Platinum resistance thermometer.
9	Thermocouple – Determination thermo-emf.
10	Helmholtz's Resonator.
11	Fourier analysis of square wave.
12	Damped oscillations – Measurement of Q factor
13	Stefan - Boltzmann law.
14	Planck's constant using LED

Relativity	
Activity 1	Study the applications of Einstein's mass energy equivalence and prepare a brief report.
Activity 2	Watch animated videos available in YouTube related to length contraction, time dilation, twin paradox etc.

Thermal Physics		
Activity 1	I feel cold because coldness enters my body. Discuss the statement in day-to-daylife.Approximately give examplesof **(i)** Opensystem **(ii)** Closedsystemand **(iii)** Isolatedsystem Discuss when the temperature of a body is locked until what time you holdthe thermometer in contact with a body. Discuss it in contact with laws ofthermodynamics. Discuss why when a person works or does exercise, he sweats. Reason it with the laws ofthermodynamics.	
Activity 2	Take four different sizes of same metal, preferable of same shape and give one piece to each group. Heat it uniformly on a hot plate. Keep a beaker of water with a thermometer immersed in it. Drop one hot metal into the water and record the temperature with time. Repeat the experiment for the other heated metal pieces of different sizes. (i) Plot a graph for the volume of the metal piece used v/s respective temperature change observed. (ii) Determine the heat capacity and specific heat of the metal used.	
Activity 3	Take ice cubes of different size and immerse in water and measure the temperature change with time and repeat the experiment. Graph the observations.	

Thermal Radiation		
Activity 1	Illuminate photo diode (as source of light) at four different applied DC voltages through spectrometer and receive the light at photo detector /photo conductor /LDR fixed in the place of eye piece of telescope and measure the current at various angles of incidence. Record the temperature of photo diode at each applied dc voltage. Plot diode current vrs Spectrometer reading. Study the family of curves obtained.	

Distribution of marks SEP- 2024 for all the Semesters

I, II, III, IV, V and VI of B Sc (Physics theory exams) - Mangalore University

Internal Assessment : 20 (max. marks per paper). Average of two tests

Semester Examination: 80 (max. marks per paper)

Total : 100 (max. Marks per paper)

Question paper pattern

Reg No. | | | | | | | | | | | | |

---------- (Paper Code)

--------- Semester B.Sc. Examination, ----------(Month) 2024

(SEP - 2024) (2024-2025 Batch Onwards)

PHYSICS (DSC)

(Title) ----------

Time: 03 Hours Max. Marks: 80

Instructions: i) Answer questions from **all** Parts.

ii) Scientific calculators are **allowed**.

Part A

I. Answer any **Eight** (answer 8(two question from each unit) out of 10)questions **1×8 = 8**

II. Answer any **Six** (answer 6 out of 8 (two question from each unit)) questions **2×6 = 12**

Part B

Answer One full question (1 out of 2) from each unit (I, II, III & IV)

Questions carrying 4 marks 1 × 4 = 4

Questions carrying 7 marks 1 × 7 = 7

(Total of each unit 4+7 =11

(Total of four units **4× 11= 44**

Part C

Problems. Answer any four (4 out of 6 at least 1 problem from each unit) **4 × 4 = 16**

Total of Part A, part B and Part C (8+12+44 +16 = 80) **= 80**

Guidelines for subject with practical's regarding student-teachers ratio for conducting practicals in SEP-2024

1. Practical batches should be formed in units 10 students in a batch for 1 teacher.
2. Under no circumstances there will be more than 20 students in a batch and more than 2 teachers in a batch.
3. If, for some reason practical batches cannot be formed strictly as per above pattern,the following student -teachers ratio pattern shall be strictly followed.

For degree classes in SEP-2024 - student-teachers ratio

Si.No.	Student strength in class of practical's	Number of teachers to be assigned
1	Up to 15	1
2	From 16 to 27	2
3	From 28 to 35	3

Distribution of marks in Practical exams:

Allotmentof marks	**I, II, III & IV Semester**	**V & VI Semester**
Formula	3	5
Circuit&diagram	3	5
Setting of the experiment	4	10
Observation& trails	10	20
Calculation&graph	3	15
Result&accuracy	3	5
Viva – Knowledgeoftheexperiment	4	10
Practical Record	10	10
Total of the above	**40**	**80**
Internalexamination& continuous evaluation	10	20
Total Marks	**40+ 10 = 50**	**80 + 20 = 100**

Social Change, Stratification and Social Mobility

B.A. Semester II

Objectives:

After the completion of this course the student will understand

1. The nature of inequalities in the society
2. The forms of social stratification in India and their dynamics
3. The dynamics of social groupings and discrimination
4. The modes of social improvement people use in their life time
5. The theories behind the social stratification and mobility

Course Outcome:

CO1. Nature of inequalities in the society
CO2. Dynamics of social groupings and discrimination
CO3. Theories behind the social stratification and mobility.
CO4. The modes of social improvement people use
CO5. Reservation policy and implications.
CO6. Welfare activities for the OBC CO7.
Nature of social mobility

Unit I Social Change 12 Hours

a. Meaning of Social Change
b. Social Change, Development and Progress
c. Characteristics of Social Change
d. Motivators – Modernization, Industrialization, Globalization

Unit II Factors of Social Change 12 Hours

a. Biological Factors
b. Ecological and Geographical Factors
c. Science and Technological Factors
d. Social and Cultural Factors

Unit III Social Stratification 12 Hours

a. Meaning and Characteristics of Stratification
b. Processes of Stratification
c. Forms of Stratification
d. Theories of Stratification

Unit IV Social Mobility 12 Hours

a. Meaning and Nature of Social Mobility
b. Characteristics of Social Mobility
c. Types of Social Mobility- Vertical and Horizontal
d. Intra and Inter – Generational Mobility, Occupational Mobility

Unit V Detriments of Social Mobility 12 Hours

a. Occupation and Income, Education
b. Gender, Marriage and Social Institutions
c. Power and Status
d. Activity – Case Study; Any one type of Social Mobility

Mangalore University

SCHEME AND SYLLABUS

For the Program

B.Sc. BIOCHEMISTRY with Three Majors

As Per SEP 2024

Academic Year 2024-25 and onwards

Department of Biochemistry
Jnana Kaveri Mangalore University
PG Centre, Chikka Aluvara

B.Sc. BIOCHEMISTRY

Preamble

The learning outcomes are designed to help learners understand the objectives of studying B.Sc. Biochemistry to analyze, appreciate, understand the basic concepts of biomolecular processes and chemical reactions occurring in the living system. This Program is fundamental to tackle many of the health – related challenges facing society. Considering the rapid and far-reaching advances in biological sciences in 21st century, it is imperative to have curriculum incorporating these updated emerging concepts of biochemistry. The current pattern is designed to impart concept based learning with emphasis on hands-on training, skill development and research. The curriculum includes courses encompassing core courses, intra and inter discipline specific courses, skill and ability enhancement courses to impart in-depth knowledge in biochemistry complemented with varied subjects and skills. The course seeks to discover and nurture typical attributes of a competent science graduate such as; spirit of inquiry, critical thinking, problem solving, analytical reasoning, aptitude to research/industry and entrepreneurial instincts.

Programme Learning Outcome

The learning outcome-based curriculum is specific in terms of changes in cognitive and psychomotor behavior of students. Biochemistry Honors course is intended to provide abroad framework enabling students to acquire a skill set that helps them understand and appreciate the field of biochemistry. The structure or design of this framework shall ensure a high standard of the Honors degree in Biochemistry at national level. The programme specifications are intended as a reference point for prospective students, current students, academic in delivering the programme and realizing its objectives.

Keeping in pace with the developmental trends in Biochemistry and allied areas, it is expected that the students undertaking Biochemistry (Honours) course become conversant with the essence of Biochemistry and exhibit certain levels of learning outcomes as proposed below;

PROGRAMME OUTCOME (PO)

PO: 1-To create interest in Biochemistry and appreciation for chemical basis of biological processes.

PO: 2-To inculcate the spirit of inquiry and value of systematic study of a discipline. Provide a general understanding of the related disciplines with a holistic knowledge generation in biological sciences.

PO: 3-Toprovideanin-depthunderstandingofchemicalreactionmechanismsinbiological processes.

PO: 4-To provide a flavor of historical developments of enzymes and their applications in research, diagnostics and various industries.

PO: 5- To gain proficiency in basic laboratory techniques and be able to apply the scientific method to the processes of experimentation, hypothesis testing, data interpretation and logical conclusions.

PO: 6-To develop problem solving and analytical skills through case studies, research papers and hands-on-experience

PO: 7-To appreciate biochemical mechanistic basis of physiological processes, metabolism under normal and pathological conditions importance and levels of metabolic regulations.

PO8- To apply and effectively communicate scientific reasoning and data analysis in both written and oral forms. They will be able to communicate effectively with well-designed posters and slides in talks aimed at scientific audiences as well as the general public.

PO: 9- To bridge the knowledge and skill gap between academic out and industry requirements.

PO: 10- To give students experience in conducting independent, hypothesis-driven, biological research, project planning and management

PO:11-Toprovideskillstopublishresearchfindings,andawarenessofIPrights,and scientific publication ethics and problems of plagiarism.

PO: 12- To prepare competent human resource with better knowledge, hands-on-experience and scientific attitude, at national and global levels for careers in research and development, academia and Pharma-, biotech- and agro-, and food processing industries.

B.Sc.BIOCHEMISTRY

Graduates with strong academic knowledge, discipline-specific and generic skills complemented with social responsibility are greatest asset of the country. The curriculum frame work under SEP for Biochemistry graduates aims to build the following attributes;

- **Disciplinary Knowledge:**
- **Communication Skills:**
- **Critical Thinking:**
- **Problem Solving:**
- **Analytical Reasoning**
- **Research Skills:**
- **Team work and Time Management:**
- **Scientific Reasoning:**
- **Reflective Thinking:**
- **Self-Directing Learning:**
- **Digital Literacy:**
- **Multicultural Competence:**
- **Moral and Ethical Values:**
- **Leadership qualities:**
- **Life-long Learning:**

B.Sc. Degree in Biochemistry
SEMESTER I

Program Name	**B.Sc., Biochemistry**	**Semester**	**I**
Course Title	**Chemical Foundations of Biochemistry**		
Course Code	**BCT 101**	No of Credits	**3**
Contact Hours	56 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment	**20**	Summative Assessment	**80**

Course Outcomes:

CO: 1- To understand the basic principles of biochemistry.
CO: 2- To understand water as solvent of life, importance of buffers in biological systems, atoms and chemical bonding.
CO: 3- To understand fundamentals of physical phenomena associated with adsorption, viscosity, osmotic pressure etc.
CO: 4- To acquire and consolidate the fundamental concepts of kinetics and reaction mechanism
CO: 5- To understand the concepts of colloids and explore its importance in everyday life.

Learning outcomes

This course will enable students to understand basic physical principles of biological systems, measurements in biochemical study, nature of chemical bonds. Also, helps them appreciate the physical properties of molecules, colloids, and basics of chemical kinetics essential for biochemistry.

Course Articulation Matrix Mapping

Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	x	x	x	x								
Critical thinking		x								x		x
Subject clarity	x	x					x					x
Analytical Skill	x				x	x				x		

SEMESTER-1

Course title: Chemical Foundations of Biochemistry	**Course credits: 03**
Total contact hours:56 hrs	**Duration of ESA/ Exam: 03 hrs**
Formative Assessment Marks: 20	**Summative Assessment Marks: 80**

BCT 101: Chemical Foundations of Biochemistry **56 Hrs**

UNIT-1 **14 hrs**

1. Overview of Biochemistry: Origin of Biochemistry as a discipline. Definition, scope and significance of Biochemistry. Chemical composition of living organisms.
2. Units and Measurements: SI units, mass, volume, temperature, amount, length and time. atomic weight, molecular weight, equivalent weight, basicity of acids, acidity of bases, Avogadro`s number, molarity, normality, molality, mole concept, concentration, mole to

molar conversion, percentage, density and specific gravity. Errors in quantitative analysis – types, sources and minimizations. Precision and accuracy.

3. Properties of water: Molecular structure of water (VSEPR theory), physical properties of water, its effect on non-polar compounds and biomolecules.
4. Physical properties of molecules: Adsorption -Definition, Freundlich and Langmuir's adsorption isotherm. Applications of adsorption. Viscosity-Definition, Experimental method of measuring viscosity of liquids and solutions by Ostwald's viscometer. Surface tension – Definition and its measurement. Distribution law -Distribution and partition coefficient. Applications of distribution law.

UNIT-2 **14 hrs**

5. Colligative properties: Osmotic pressure and its measurements by Berkely and Hartley's method. Laws of osmotic pressure. Hypo, hyper and isotonic solutions. Effects of osmotic pressure on living cells. Donnan membrane equilibrium.
6. Ionic equilibria: Lewis concept of acids and bases. Ionic product of water. pH scale, buffers, Henderson-Hasselbalch equation, buffer capacity, preparation of acidic and basic buffer solutions. Theory of acid base indicators. Choice of indicators. pH titration curves and isoelectric pH of amino acids. Electrodes (Hydrogen Electrode & Calomel electrode), glass electrode. Conductometric titrations [Strong acid against strong base, weak acid (amino acid) against strong base. Measurement of pKa of amino acids using pH meter.

UNIT-3 **14 hrs**

7. Chemical bonding: Types of bonds& bond characteristics - Ionic, covalent, co-ordinate bonds. Atomic orbitals and molecular orbitals – Molecular Orbital Theory, Linear combination of atomic orbitals, bonding and anti-bonding of molecular orbitals, sp, sp2, sp3 and sp3d2 hybridizations with suitable examples. Sigma and pi bonds with examples. Vander Waal's forces, ion-dipole, dipole – dipole interactions, London forces, hydrophobic interaction, hydrogen bonding. Effect of chemical forces on physical properties Solubility, BP and MP.
8. Co-ordination compounds: Transition metals, properties (Colour, oxidation states, magnetic properties). Co-ordinate bond, double and complex salts – differences with examples. Postulates of Werner's theory. Types of ligands – uni, bi and polydentate with examples. Co- ordination number. Porphyrin nucleus and classification. Important metallo porphyrins occurring in nature-structure and their biological importance (Hb, cytochrome, chlorophyll, VitaminB12). Bile pigments – Types, structure and chemical nature.

UNIT-4 **14 hrs**

9. Chemical kinetics: Introduction, Rate of reactions, rate law or rate equation, molecularity and order of a reaction with examples, velocity constant or rate constant and half-life period expressions for zero, first and second order reactions with derivations ($a=b$ and $a \neq b$), rate constant of irreversible reaction, kinetics of reversible reaction (without derivation). Numerical problems. Effect of temperature, pressure and catalyst on rate of reaction, Arrhenius equation and Arrhenius interpretation of energy of activation. Transition state theory.

10. Colloids: true solutions, classification, peptisation, purification, ultrafiltration, Brownian movements, electric properties, coagulation, lyophilicsols, lyophobicsols, dialysis-electro and persistent dialysis, addition of electrolytes, colloids in daily life and applications. Emulsion, types, micelles with biomolecules and its biological applications.

Suggested Readings:

1. Advanced Inorganic Chemistry: A comprehensive Text,1999, Cotton A and Geoffrey Wilkinson, 6th edition , Wiley publication
2. Inorganic Chemistry, 2014, Miessler GL, Paul Fischer PJ,and Tarr DA, 5thedition, Pearson Publication.
3. Inorganic Chemistry, 2004, Catherine E and Sharpe AG, ACS publication
4. Inorganic Chemistry, 2015,Overton, Rourke, Weller, Armstrong and Hagerman, Oxford Press
5. PhysicalChemistry:A molecular approach, 2019, Donald A, McQuarrie and Simon JD, Viva Books Publication.
6. P Puri, Sharma, Pathania Text Book of Physical Chemistry,Vishal Publishing Company, 48th Edition, 2022.
7. Puri, Sharma, Pathania Text Book Of Inorganic Chemistry, Vishal Publishing Company, 33rd Edition, 2022.
8. A Guide to Organic Reaction Mechanism-P. Sykes, 6thEdition, Pearson Education, 1986.
9. General & Inorganic Chemistry-R Sarkar, New Central Book Agency; 3rdEdition, 2011.
10. F. A. Cotton &G. Wilkinson. Basic Inorganic Chemistry, John Wiley (1998).
11. Douglas, Mcdaniel and Alexander: Concepts and Models in Inorganic Chemistry, John Wiley, 3rd Edition (1994).
12. James E. Huheey, Ellen Keiter And Richard Keiter: Inorganic Chemistry: Principles Of Structure And Reactivity, Pearson Public, 4thEdition (2013).
13. Pattabhi. V. And Gautham. N. (2002) Biophysics. Narosa Publishing House, India.
14. https://www.mooc.org/
15. https://swayam.gov.in/CEC
16. Physical chemistry 2019, Atkins P, Paula JD, Keeler J , 11th edition , Oxford press.

Pedagogy

Mooc / Desk Work / Book Chapter/ Problem Solving/ Assignment

Formative Assessment

Sl. No.	Continuous Assessment Program/Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	**10**
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	**05**
03	Attendance with proper record	**05**
	TOTAL MARKS	**20**

SEMESTER-1

PRACTICALS-1

Program Name	**B.Sc., Biochemistry**	**Semester**	**I**
Course Title	**Experimental Biophysical Chemistry**		
Course Code	**BCP 102**	**No of Credits**	**02**
Contact Hours	**04 hrs/week**	**Duration of SEA/Exam**	**3 Hours**
Formative Assessment	**10**	**Summative Assessment**	**40**

BCP 102: Experimental Biophysical Chemistry **32 Hrs**

Learning outcomes:

This course aims to familiarize students with the principles of analytical chemistry and basic analytical techniques such as volumetric analysis. Course objective is to provide skills to apply biophysical/chemical principles to understand biological processes. Also, helps them appreciate the physical properties of molecules, colloids, and basics of chemical kinetics essential for biochemistry.

Experiments:

1. Concept of molarity, molality and normality. Calculation and preparation of molar solutions. (Problems to be given in exams). Calculation and preparation of normal solutions and percent solutions and dilute solutions.
2. Calibration of volumetric glassware (Burette,pipette and volumetric flask).
3. Preparation of standard sodium carbonate solution, standardization of HCl (Methylorange) and estimation of NaOH in the given solution. (Methyl orange orphenolphthalein).
4. Preparation of standard oxalic acid. Standardization of NaOH and estimation of H_2SO_4in the given solution (phenolphthalein).
5. Preparation of standard $K_2Cr_2O_7$. Standardization of $Na_2S_2O_3$and estimation of $CuSO_4$in the given solution.
6. Preparation of $ZnSO_4$. Standardization of EDTA and estimation of total hardness of water using eriochrome black-T indicator.
7. Preparation of standard potassium bipthalate. Standardization of NaOH and estimation of HCl in the given solution. (Phenolphthalein).
8. Calibration of pH meter and Preparation of buffers-acetate, citrate and phosphate buffers.
9. Conductometric titration of strong acid against strong base.
10. Conductometric titration of weak acid (amino acid) against strong base.
11. Determination of rate constant of decomposition of H_2O_2 using $KMnO_4$ by volumetric analysis method.
12. Determination of density and viscosity of the given liquid using specific gravity bottle and Ostwald's viscometer.
13. Determination of density and surface tension of the given liquid using specific gravity bottle and stalagmo meter.

Suggested Readings:

1. Svehla, G.Vogel's Qualitative Inorganic Analysis,Pearson Education, 2012.
2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.

3. Dr. O. P. Pandey, D.N. Bajpai, Dr. S. Giri, Practical Chemistry, S. Chand and Co.Ltd.,
4. Principles of Practical Chemistry-M.Viswanathan
5. Instrumental Methods of chemical Analysis. B.K. Sharma.
6. Experiments in Physical Chemistry R.C. Das and B. Behra, Tata McGraw Hill
7. Advanced Practical Physical Chemistry J.B. Yadav, Goel Publishing House
8. Advanced Experimental Chemistry. Vol-I J. N. Gurtu and R Kapoor, S.Chand and Co.
9. Practical Chemistry, K. K. Sharma, D. S.Sharma (Vikas Publication).
10. General Chemistry experiment –Anil J Elias (University press).
11. Vogel text book of quantitative chemical analysis , G.H. Jeffery, J.Basset.
12. Quantitative chemical analysis, S.Sahay (S. Chand &Co.).
13. Practical Chemistry Dr O P Pandey, DN Bajpai, Dr S Giri. S.Chand Publication
14. College Practical Chemistry.VK Ahluwalia, Sunitha Dingra, Adarsh Gulati
15. Practical Physical Chemistry-B. Viswanathan, P S Raghavan.MV Learning Publication

Pedagogy:

Mook/Desk work/Book chapter/Problem solving/Assignment

Formative Assessment	
ASSESSMENT OCCASION	**WEIGHTAGE IN MARKS**
Continuous Evaluation and Class Test	05
Record	05
Total	**10**

Summative Assessment	
ASSESSMENT OCCASION	**WEIGHTAGEINMARKS**
Performance of Experiments	30
Viva-voce	10
Total	**40**

B.Sc. Degree in Biochemistry
SEMESTER II

Program Name	**B.Sc. Biochemistry**	**Semester**	**II**
Course Title	**Bio-Organic Chemistry**		
Course Code	**BCT 201**	**No of Credits**	**03**
Contact Hours	**04 Hrs/week**	**Duration of SEA/Exam**	**3 Hours**
Formative Assessment	**20**	**Summative Assessment**	**80**

Course Outcomes:

CO1: To understand the fundamentals of organic chemistry and their importance in understanding Biochemical reactions

CO2:To acquire knowledge of organic reactions, isomerism and Stereochemistry of molecules

Learning outcomes:

This course helps the students to understand the significance of organic reactions and their relevance to biological systems. It helps to gain a good understanding of aliphatic and aromatic compounds, nomenclature, reactivity of functional groups, the importance of stereo isomers in biological systems, and structure activity relationships in bio molecules.

Course Articulation Matrix Mapping

Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
Aptitude	x	x	x	x								
Critical thinking		x	x	x	x					x		
Subject clarity	x	x					x					x
AnalyticalSkill	x	x			x	x						

Pedagogy

MOOC/ Desk Work/ Book Chapter/ Problem Solving/Assignment

Formative Assessment

Sl. No.	Continuous Assessment Programme / Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	Attendance with proper record	05
	Total Marks	20

BCT 201: Bio-Organic Chemistry **56 hours**

UNIT-I 14 Hours

1. Introduction to organic chemistry: Classification of organic compounds, unique characteristics, IUPAC nomenclature of organic compounds (including bi-functional) and biomolecules.
2. Hydrocarbons: Markownikoff and anti-Markownikoff addition. Addition of HBr to propene. Alkenes – Ozonolysis, oxidation. Dienes – types with examples, 1, 3 butadiene–Preparations, stability and mechanism of addition of HBr. Diels-Alder reaction. Conformational analysis of ethane.
3. Reaction mechanisms: Concept of inductive effect, resonance and hyper conjugation. Classification of organic reactions (substitution, addition, elimination and rearrangement), with one examples for each. Concepts of the following –carbanions, carbocations, free radicals, carbenes, nucleophiles and electrophiles (Formation and Stability).
4. Alkyl halides and organometallic compounds: SN^1, $SN^2$and SN^i reactions, their mechanism with one example for each. Concept of elimination reactions (E_1, $E_2$and E_{1CB} with an example). Organometallic compounds – definition and applications of organo lead, organo lithium, cis-platin molecules

UNIT-II **14 Hours**

5. Arenes: Structure of benzene – by Resonance and Molecular orbital theories.

Aromaticity (Huckel's rule). Mechanism of Nitration and Friedel- craft reaction. Electronic interpretation of the orientating influence of substituents in the electrophilic substitution of toluene, chlorobenzene, nitrobenzene and phenol. Resonance structures of naphthalene and anthracene.

6. Stereochemistry: Stereoisomerism, types, Fischer-projection formulae, chiral carbon atom, asymmetry and dissymmetry, chirality, conditions for optical isomerism ex: glyceraldehyde, lactic acid, tartaric acid, Nomenclature of enantiomers, diastereomers. Epimers and anomers. D and L notation, R and S system, racemization and resolution (Biochemical, chemical and physical methods). Geometrical isomerism. E and Z notations. Stereochemistry in Biological systems

UNIT-III **14 Hours**

7. Cycloalkanes: Reactivity and relative stability. Bayer's strain theory. Sachse-Mohr theory. Boat and chair forms of cyclohexanes. Axial and equatorial bonds and their relation with biological activities of carbohydrates (Ex. Glucose)
8. Alcohols: Definition, classification, monohydric alcohols-distinguishing reactions for primary, secondary and tertiary alcohols. Dihydric alcohols: Glycol, preparation (any 2 methods) and uses. Trihydric alcohols: Glycerol, synthesis from propene, properties, (reaction with conc. H_2SO_4, HNO_3, Oxalic acid and HI). Phenols: Acidity of phenols, effect of substituent on acidity.
9. Hydroxy acids and dicarboxylic acids: Structure & biological importance of hydroxy acids: Lactic acid, citric acid and isocitric acid. Dicarboxylic acid: Maleic and fumaric acid. Keto acids: Pyruvic, α-ketoglutaric, oxaloacetic acids and acetoacetic acid
10. Carbonyl compounds: General properties. Aldehydes and ketones. Keto-enol tautomerism, Mechanism: Claisen and aldol condensations. Quinones: Biologically important quinones.
11. Amines: Classification, properties, functional amino group – Basicity of amines, acylation. Reactions with HNO_2& Schiff's base formation. Distinguishing reactions of primary, secondary and tertiary amines.

UNIT-IV **14 Hours**

12. Heterocyclic compounds: Definition, classification with examples, structure and biological importance of furan, pyrrole, thiophene, pyridine, pyran, thiazole, pyrimidine, purine, indole, imidazole, quinoline and isoquinoline. Basicity of pyrrole and pyridine.
13. Terpenes: Definition, isoprene rule, classification, isolation, structure and biological importance of menthol, camphor, farnesol, phytol, lanosterol, lycopene and dolichols.
14. Steroids: Basic ring structure in steroids. Structure and biological importance of cholesterol, phytosterols and ergosterol. Bile acids [Mono, Di & Tri cholic acids].
15. Alkaloids: Definition, classification based on their structure and biological functions, isolation, structure and biological action of morphine, nicotine & atropine. Chemical synthesis of nicotine and atropine.
16. Drugs: Classification of drugs; synthesis and uses of sulphanil amide and paracetamol. Antibiotics: Definition; types; sources; structures and antimicrobial spectrum of action of penicillin, chloroamphenicol, streptomycin and tetracyclines.

SEMESTER II

PRACTICAL-II

Program Name	B.Sc. Biochemistry	Semester	II
Course Title	Experimental Bioorganic Chemistry		
Course Code	BCP 202	No of Credits	2
Contact Hours	32 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment	10	Summative Assessment	40

Learning outcomes:

This laboratory course is aimed at imparting skills of identifying organic compounds, demonstrating reactivity of various functional groups, and synthesis of simple organic compounds of biological importance.

BCP 202: Experimental Bioorganic Chemistry 32 Hours

1. Systematic qualitative analysis of the organic compounds: Urea, benzamide, benzaldehyde, aniline, acetophenone, nitrobenzene, chlorobenzene, benzoic acid, salicylic acid, resorcinol, and ethyl acetate.

2. Organic preparations: Aspirin from salicylic acid, benzoic acid from benzaldehyde, and meta-dinitrobenzene from nitrobenzene.

Suggested Readings:

1. Arun Bahl and B.S. Bahl: Advanced Organic Chemistry, S. Chand. (2019)
2. L. Finar: Organic Chemistry (Vol. I & II), E.L.B.S.(2002)
3. R. T. Morrison &R. N. Boyd :Organic Chemistry, Prentice Hall.(2011)
4. Stereochemistry of organic compounds: Principles, and applications D. Nashi puri, New York : Wiley 1991.
5. Basic Stereochemistry of Organic Compounds-S. Sengupta, 2nd Edition,Oxford University Press, 2018.
6. A Guide to Organic Reaction Mechanism-P. Sykes, 6th Edition, Pearson Educaton,1986.
7. https://www.mooc.org/
8. https://swayam.gov.in/CEC

B.Sc. Degree in Biochemistry

Scheme of Examination

Title of the paper	Contact hours/ week	Exam. hour	IA	Marks	Total Marks	Credits
First Semester						
Biochemistry-I: BCT 101 **Chemical Foundations of Biochemistry**	4	3	20	80	100	3
Biochemistry Practical-I:BCP-102 **Experimental Biophysical Chemistry**	4	3	10	40	50	2
Second Semester						
Biochemistry-II:BCT 201 **Bioorganic Chemistry**	4	3	20	80	100	3
Biochemistry Practical-II:BCP 202 **Experimental Bioorganic Chemistry**	4	3	10	40	50	2

Theory question paper pattern:

Each theory question paper has three Sections;

1. 25% of the marks seeking short answers; Student has to answer all the questions of marks each.
2. 37.5% of marks seeking medium size answers: Student has to answer 6 out of 8 questions of 6 marks each.
3. 37.5% of question seeking comprehensive answers: Student has to answer 3 out of 4 questions of 10 marks each. These questions may include sub questions (5+5).

Internal Assessment: Tests: 10 Marks (two internal tests to be conducted and average is considered for assessment)

UNDERGRADUATE B.Sc. SEMESTER
I&II QUESTION PAPER MODEL

BIOCHEMISTRY

Practical proper Examination I&II semesters

Duration: 3Hrs

- Experimentation (Major &Minor/Spotters) - 30 Marks
- Viva-Voice - 10 Marks

Total 40 Marks

Internal Assessment for Practical Paper I-VI semesters

- Attendance - 05Marks
- Record/Journal - 05Marks

Total 10 Marks

Continuous Assessment Programme / Internal Assessment /Formative Assessment for Major program/Subject: Biochemistry

Sl. No.	Continuous Assessment Programme / Internal Assessment	Maximum Marks
01	Two Session Tests with proper record for assessment (5+5=10)	**10**
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	**05**
03	• Attendance with proper record	**05**
TOTALMARKS		**20**

- **Attendance Marks-breakup**

<75% - 00Marks
75-80%- 01Mark
80-85%- 02Marks
85-90%- 03Marks
90-95%- 04Marks
>95%- 05Marks

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR COURSE/SUB

JECT: BIOCHEMISTRY
(Semesters I & II)

B.Sc. Semester-I Degree Examination; 2024-25
(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: BIOCHEMISTRY

Paper –_____: _____
Paper Code: _____

Time: 3Hours **Max.Marks:80**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labeled diagrams wherever necessary.

SECTION-A

1. Answer **all** the following questions: **(2×10=20)**

a)

b)

c)

a)

b)

c)

d)

e)

f)

g)

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

2. From Unit-I

3. From Unit-I

4. From Unit-II

5. From Unit-II

6. From Unit-III

7. From Unit-III

8. From Unit-IV

9. From Unit-IV

SECTION-C

Answer **Any Three** of the following: **(10×3=30)**

10. From Unit-I

11. From Unit-II

12. From Unit-III

13. From Unit-IV

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Syllabus for B.Sc.(Biotechnology)
SEP- 2024

Semester I								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		Cell Biology and Genetics	Theory	4	80	20	100	3
2		Cell Biology and Genetics practical	Practical	4	40	10	50	2
Semester II								
3		Biochemistry and Biophysics	Theory	4	80	20	100	3
4		Biochemistry and Biophysics Practical	Practical	4	40	10	50	2
SEMESTER III								
5		Microbiology and Immunology	Theory	4	80	20	100	3
6		Microbiology and Immunology practical	Practical	4	40	10	50	2
SEMESTER IV								
7		Molecular Biology and Recombinant DNA Technology	Theory	4	80	20	100	3
8		Molecular Biology and Recombinant DNA Technology Practical	Practical	4	40	10	50	2
SEMESTER V								
9		Plant Biotechnology	Theory	4	80	20	100	3
10		Animal Biotechnology	Theory	4	80	20	100	3
11		Plant Biotechnology	Practical	4	40	10	50	2
Semester VI								
12		Bioprocess and Environmental Biotechnology	**Theory**	**4**	**80**	**20**	**100**	**3**
13		Biostatistics and Bioinformatics	**Theory**	**4**	**80**	**20**	**100**	**3**
14		Bioprocess, Environmental Biotechnology, Biostatics and Bioinformatics Practical	Practical	4	40	10	50	2

Core Courses

SEMESTER-I

Code :CELL BIOLOGY AND GENETICS 56 hours

Course Outcomes: After successful completion of this Course, students will be able to:
CO 1. Understand concepts of Biotechnology and demonstrate knowledge acquired in interdisciplinary skills in cell biology, genetics, biochemistry, microbiology, and molecular biology
CO 2. Describe the ultrastructure of cells, structure and function of organelles, cytosol and cytoskeleton
CO 3. Understand phases of cell cycle, cell division, reductional division in gametes, molecular mechanisms that regulate life and death of a cell including programmed cell death or apoptosis and cell cycle regulation.
CO 4. Comprehend organization and structure of chromosomes, and Mendelian laws of inheritance, deviations and exceptions to these laws.
CO 5. Describe mutations at the molecular level, types of mutations, genetic or hereditary disorders and concepts in population genetics

UnitI (14 hours)

Discovery of cell, the cell Theory, classification of cell types. Levels of organization in cell biology: cell, tissue, organs and organism. Ultra structure of a eukaryotic cell- (Both plant and animal cells),Surface Architecture: Structural organization and functions of plasma membrane and cell wall of eukaryotes. Cellular Organelles: Structure and functions of cell organelles – Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast, Ribosomes, Lysosomes, Peroxisomes, Nucleus (Nuclear envelope with nuclear pore complex, Nucleolus, Nucleoplasm and Chromatin). Vacuole, Cytosol and Cytoskeleton structures (Microtubules, Microfilaments and Intermediate filaments)

UnitII (14 hours)

Chromosomes and cell division: General Introduction, Discovery, Morphology and structural organization –chromatids, Centromere, Secondary constriction, Telomere, Chromonema, Euchromatin and Heterochromatin, Chemical composition and Karyotype. Nucleosome organisation. Special type of chromosomes: Salivary gland and Lamp brush chromosomes.
Cell Division: Cell cycle, phases cell division. Mitosis and meiosis, regulation of cell cycles cell cycle checkpoints. Significance of cell cycle,synaptonemal complex.Cell Senescence and programmed cell death.

UnitIII (14 hours)

Mendelian laws of inheritance - dominance, segregation, incomplete dominance, codominance with an example. Law of independent assortment, test cross, back cross. Deviations to Mendelian inheritance, complementary, supplementary and interaction of genes (13:3 ratio), epistasis, polygenic inheritance and multiple alleles.
Maternal Inheritance: Extrachromosomal inheritance, mitochondria and chloroplast genetic systems.Sex-linked inheritance, Chromosome theory of inheritance.
Sex determination in plants and animals: Concept of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ, ZO-ZZ types.

UnitIV **(14 hours)**

Finestructureof gene-recon,mutonand cistron.

Mutations: Types of mutations, Spontaneous and induced mutations, Mutagens chemicalandphysicalmutagens,inducedmutationsin plants and microbes and its applications.

Structural and numerical aberrations of chromosomes; evolutions of wheat, and cotton

Hereditary defects: Kleinefelter, Turner, Cri-du- Chat and Down syndromes. Analysis of mutations in Biochemical pathways, one gene - one enzyme hypothesis. Population genetics: Hardy- Weinberg equilibrium, gene, genotypes and gene frequencies.

References

DaleJW.1990.*Molecular genetics of Bacteria*.John Wileyand Sons.

DeRobertisEDPandDeRobertisEMF.1995.*CellandMolecularBiology*.8th edition, BI Waverly Pvt.Ltd., New Delhi.

Gardner*etal*.2003.*PrincipleofGenetics*-8th edition.JohnWileyandSons,New York.

GuptaML.andML.Jangir.2002.*CellBiology-FundamentalsandApplications*. Argosies, Jodhpur, India.

Lewin B.1994. *GenesVII*5th edition. Oxford University Press,London.

PowarCB.*CellBiology*3rd edition.HimalayaPublishingHouse,Mumbai.

Rajeshwari S Setty and V.Sreekrishna.2002.*Biotechnology*-2(Cellbiology, Genetics, Microbiology). New Age International Publishers, New Delhi.

TaylorDJ.GreenNPOandStoutGW.1998.*BiologicalScience*3rd Edition, Cambridge edition, Cambridge University Press, UK.

Sub Code :CELL BIOLOGY AND GENETICS PRACTICAL

1. Study and maintenance of simple and compound microscope
2. Use of Micrometer and calibration, measurement of onion epidermal cells
3. Study of divisional stages in mitosis from onion root tips
4. Study of divisional stages in meiosis in grasshopper testes/onion or Rheo flower buds.
5. Salivary gland chromosome isolation and staining.
6. Buccal smear – Barr bodies
7. Counting of RBC/WBC by Haemocytometer.
8. Karyotype analysis
9. Isolation of chloroplast.
10. Study of drosophila.
11. Separation of drosophila eye pigment by paper chromatography
12. Simple genetic problems based on theory

SEMESTER–II

Sub Code :BIOCHEMISTRY AND BIOPHYSICS 56 hours

Course Outcomes (COs): At the end of the course the student should be able to:

CO 1. Acquire knowledge about types of biomolecules, structure, and their functions

CO 2. Will be able to demonstrate the skills to perform bioanalytical techniques

CO 3. Apply comprehensive innovations and skills of biomolecules to biotechnology field

Unit I ` **(14 hours)**

Aimsand scopeof biochemistryand biophysics

General classification, structure and functions of biomolecules: carbohydrates, proteins,lipids and nucleic acids. Detailed structure and general properties of monosaccharides, glycosidic bond; structural polysaccharides - cellulose, chitin, peptidoglycans; storage polysaccharides - starch, glycogen. Classification of standard amino acids, peptide bonds, general properties of amino acids, titration curve. Protein structure - primary, secondary, tertiary and quaternary with examples.

UnitII **(14 hours)**

Enzymes: History, general properties, active site, Michelis Mentonequation,allosteric enzymes; nomenclature and classification. Enzyme inhibition types- reversible, non-competitive and uncompetitive with examples. Multienzyme and isoenzyme with examples. Brief account of applications enzymes: enzymes in genetic engineering - restriction enzymes and polymerases; enzymes in clinical significance - LDH, SGOT, SGPT and diagnostic kits.

UnitIII **(14 hours)**

Structure and function of water, pH impact on biomolecular reactions, Handerson and Hasselbach's equation with applications. Buffers- types and applications. Laws of thermodynamics, free energy, ATP as biological energy currency.

Lambert - Beer's law, absorption spectrum, absorption maxima. UV-Vis spectroscopy; mass spectroscopy, atomic absorption spectroscopy with applications. Brief account of principles and applications to understand the structure of molecules: X-ray crystallography and NMR.

UnitIV **(14 hours)**

Microscopy: Magnification, Resolution power, Optical - Bright field, dark field, phase contrast and fluorescence; Electron microscopy - TEM and SEM. Partition coefficient, Paperandthinlayerchromatography-principle,methodology,applications and significance of Rf value. Gel filtration chromatography, affinity chromatography, gas liquid chromatography and high performance liquid chromatography. Principle, procedure and applications of electrophoresis- agarose and polyacrylamide gel electrophoresis. Centrifugation: differential, density gradient and ultra - principle, instrumentation and applications

References

AroraMP.2007.*Biophysics.*Himalaya PublishingHouse,NewDelhi.

Bialek W. 2012. *Biophysics: Searching for Principles*. Princeton University Press.

DaSkoogeHolt-Saunders.1985.*Principlesofinstrumentalanalysis*.HoltSaunders.

LeningerAL,NelsonDLandCoxMM.1993.*PrincipleofBiochemistry.*CBSPublications. Nickolas CPL.1982. *Fundamentals of Enzymology*. Oxford Publishers.

StryerL.1988.*Biochemistry*3rdedition,Freeman&Co,New York.

Trevor.Enzymebiochemistry,BiotechnologyandClinicalChemistry.HarwoodPublishers.

UpadhyayandUpadhyay A.2000.*BiophysicalChemistry-PrinciplesandTechniques*. HimalayaPublishers,NewDelhi,

ZubayJ.1988. *Biochemistry*2ndedition.MacMillanPublishingCompany,NewYork.

Sub Code :BIOCHEMISTRY AND BIOPHYSICS PRACTICAL

1. Introduction to basic instruments (Principle, standard operating procedure) with demonstration.
2. Microscopy
3. Preparation of standard buffers– Citrate and phosphate, determination of pH of solution using pH meter.
4. Qualitativetestsforcarbohydrates-monosaccharides,disaccharidesandpolysaccharides.
5. Qualitative tests for proteins.
6. Estimation of maltose by DNS method
7. Determination of α-amylase activity by DNS method
8. Estimation of proteins by Lowry's and Biuret method
9. Lambert – Beer's law
10. Absorption maxima of a solution
11. Paper chromatography
12. Thinlayerchromatography
13. Gel Electrophoresis

SEMESTER–III

Sub Code :MICROBIOLOGY AND IMMUNOLOGY 56 hours

After successful completion of this Course, students will be able to:

CO 1. Understand Historical prospective and scope Microbiology

CO 2. Experiment with various methods of sterilization in microbiological work

CO3. Prepare different types of media, perform culture methods, preservation of microorganisms for isolation, characterization of microbes

CO 4. Handle and use antimicrobial agents and perform anti-microbial assays

CO 5. Demonstrate the Laboratory skills in basic and applied microbiology with reference to technological aspects.

CO6.Demonstrate comprehension of the underlying structure and function of the immunesystem and related disorders.

CO 7. Demonstrate an understanding of the role of cells and molecules in immune reactions and responses

CO8. Demonstrate technical skillsin immunological tools and techniques

CO 9. Explain the fundamental concepts of immunity, and the contributions of the organs and cellsin immune responses.

CO 10. Realize how the MHC molecule's function and host encounters an immune insult.

CO 11.Understand the antibodies and complement system

CO12. Comprehend the overreaction by our immune system leading to hypersensitive conditions and its consequences

UnitI (14 hours)

Aim, scope and historical perspectives of microbiology. Contributions of early microbiologists: Leeuvenhoek, LouisPasteur,RobertKoch andEdwardJenner.General classification of microbial kingdom - classical, nutritional and molecular approaches. Conceptsof sterilization and disinfection: dry heat, moist heat, radiation, chemical and filtration. Introductive concepts in virology- classification, structure and life cycle - lysogenic and lytic cycle.Antibiotics:classification and mode of action.

UnitII (14 hours)

Prokaryotic and eukaryotic microbesand theircharacteristics.Structureand functions of microbial cell wall, lipopolysaccharides, flagella, capsules, endospores, pili (fimbriae), cell membranes and cell inclusions.

Culture Media: Components of media, natural and synthetic media, selective, differential, indicator, enriched media.

Pure culture methods: Serial dilution and plating methods (pour, spread, streak); maintenance and preservation/stocking of pure cultures

Microbes in extreme environments- thermophiles, psychrophiles, acidophiles, alkaliphiles, halophiles and barophiles. Microbe -microbe interactions.

UnitIII (14 hours)

Historical perspectives in immunology, Origin and diversity of immunology. Classificationofimmunity:innateandadaptiveimmunity. Immune systems:organs,cells ofimmune system. Role of B cell and T cell in humoral and cell mediated immunity.Majorhistocompatibilitycomplexes(MHCs)-types,structureandtheir functions.Structure, types and functions of antigens. Haptenes and adjuvants, Structure, types and functions of antibodies.

UnitIV (14 hours)

Antigen-antibodyreactions - precipitin test, agglutination test, complement fixation (or complement cascade) reaction and ELISA. Immunoblot - types, principle and applications. Immunological disorders -autoimmune diseases - Brief descriptions of two autoimmune diseases- Rheumatoid arthritis and myasthenia gravis. Acquired immunodeficiency syndrome: description of causative agent, and briefly description of mechanisms. Hypersensitivity and allergy. Vaccines-classical and modern.

References

AbbasA, Lichtman AHand Pillai S. 2015.*Cellular and Molecular Immunology.*Elsevier Saunders Co.

BrockTBandMadigon.1988.*BiologyofMicroorganisms*.PrenticeHall,NewJersey. Cassida, L.E. 1968. *Industrial Microbiology*John Wiley & Sons.

Ivan Riott JonathanBrostoffandDavidMale.*Immunology*3rdedition.MosbyPublishers. Janeway and Travers.*Immunobiology* 3rd edition. Churchill Livingstone Publications.

KubyJ. 2000. *Immunology*.Freemanand CompanyPublishers.

Maloy SR. Friefelder 1994. Microbial Genetics. Jones and Bartlett Publishers.PelczarJ.andChanECS.1993.*ElementofMicrobiology*MacGrawHill,NewYork.

PelczarMJ,ReidRDandChanECS.1997.*Microbiology,dynamicsanddiversity*.Haricot Brace College Publishers.

PrescottLM,HarleyJKandOxfordDA.1993.*Microbiology*.WMCBrownPublishers, USA.

SchlegelHarisG.1988.*GeneralMicrobiology*6thedition. CambridgeUniversityPress, UK.

Sharma PD.1991.*Microbiology*, Rastogi Publications, Meerut.

Subba Rao N.S. 1974. *Soil Microbiology*, 4th edition, Oxford & IBH Publishers, New Delhi

Torture GJ, Frank BR, and CaseCL.1992. *Microbiology- An Introduction.*Communing Publishing Company Inc, California.

Sub Code :MICROBIOLOGY AND IMMUNOLOGY PRACTICAL

1. Instrumentation and microscopy with special reference to microbiology andimmunology.
2. Sterilization techniques – dry heat sterilization with hot air over, wet heat sterilization with autoclave, membrane filtration and assessment for sterility
3. Preparation of culture media for bacteria, fungi and their cultivation
4. Plating technique –pour plate and spread plate
5. Isolation of microorganisms - air, water, human body and soil.
6. Study of bacterial colony characteristics.
7. Purification of bacterial and fungal cultures using streak plate technique/mycelial bit transfer
8. Culture preservation techniques – slant and stab culture
9. Staining of microorganisms - Gram staining, capsule staining, spore staining, negative staining.
10. Biochemical activitiesofmicroorganisms -indole,methyl red,VogesProskauerandcatalase tests.Starch hydrolysis, Catalase test, Gelatin hydrolysis
11. Antibioticsensitivityof microorganisms. .
12. Blood grouping and Rh factor determination.
13. Studyofdifferenttypesofleucocytes.
14. Immunodiffusionstudies.
15. Dot ELISA

SEMESTER-IV

Sub Code :MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY
56 hours

Course Outcomes (COs): At the end of the course the student should be able to:

CO 1. Study the advancements in molecular biology with latest trends.

CO 2.Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids.

CO 3. Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms.

CO 4. Demonstrate a thorough understanding of the fundamental principles and techniques of genetic engineering.

CO 5. Apply the knowledge of genetic engineering to diverse applications in agriculture, medicine, biotechnology, and environmental science.

CO 6. Perform laboratory procedures and develop practical skills in genetic engineering techniques.

CO 7. Evaluate genetic engineering's ethical, social, and legal implications and propose responsible solutions.

CO 8. Stay updated with recent advancements in genetic engineering, critically evaluate emerging trends, and assess their potential impact on various fields.

UnitI **(14 hours)**

Discovery, structure and types of DNA and RNA. Experiments on DNA as genetic material. ReplicationofDNAinprokaryotesandeukaryotes.– Enzymes and proteins involved in replication, Theta model and rolling circle model. Polymerases and all enzyme components.Mechanisms of DNA recombination in prokaryotes and eukaryotes. DNA damage and Repair mechanism: photo reactivation, excision repair, mismatch repair and SOS repair.

UnitII **(14 hours)**

Structureofprokaryoticandeukaryotic genes.Cerntral dogma of molecular biology. Transcription in prokaryotes RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains. Transcription in eukaryotes: Eukaryotic RNA polymerases, mechanism of transcription initiation, promoter clearance, elongation and termination. Post transcriptional modification. RNA splicing and processing: Genetic code and its characteristics, Translation- in prokaryotes and eukaryotes.Prokaryoticgeneexpression- *lac* And*trip*..

UnitIII **(14 hours)**

Aims, objectives and scope of gene cloning and steps involved recombinant DNA technology. Isolation and purification of DNA from bacterial, plant and animal cells. Tools of DNA modification: restrictionenzymes-properties,classification,typeswithexamples;ligation,DNAmodifying enzymes.DNA vectors: plasmids, bacteriophages,cosmids, BAC, YAC,plant and animal viruses. Gene transfer technique.

UnitIV **(14 hours)**

Genomic and cDNA libraries: features, construction and application. Screening and selection of recombinants by selection media, insertional inactivation. PCR- principle, protocol and applications. DNA sequencing- Sanger's, next generation sequencing. Gene editing techniques principle and applications. Blotting techniques: Southern, Northern and Western-principle and applications. Probes - types, preparation and application. DNA finger printing-principle and applications. Hazards and biosafety measures for recombinant DNA technology and GMOs.

References

Alberts B, Bray D, Lewis J, Raff M, Roberts K and Watson JD. 2002. *Molecular Biology of the Cell* 4th edition. Garland Publishing, Inc., New York.

Cooper GM. 2000. *The Cell - A Molecular Approach* 2nd edition. Sunderland (MA): Sinauer Associates, Inc.

De Robertis EDP and De Robertis EMF. 1995. *Cell and Molecular Biology*. 8th edition, BIWaverly Pvt.Ltd., New Delhi.

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PrimroseSB,RichardM.TwymanRMandOldRW.2002.*PrinciplesofGeneManipulation* 6th edition.Blackwell Publishers.

Watson JD, Gilman M, Witkowski J and Zoller M. 1992. *Recombinant DNATechnology* 2nd edition.Scientific American Books, New York.

WatsonJD*etal*.1987.*MolecularBiologyofgene*.4th edition.BenjaminCumming Publishers,

WilsonK.andWalkerJ.2005. *Principls andTechniquesofBiochemistryandMolecular Biology*6th edition. Cambridge UniversityPress.

Sub Code :MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY PRACTICAL

1. Preparation of DNA model
2. IsolationofDNAfrombacteria,plantandanimaltissues.
3. Isolation of RNA
4. TestsforDNA/RNA/proteinsisolatedfromtissues
5. Estimation of DNA by DPA method
6. Estimation of RNA by Orcinol method
7. Column chromatography – gel filtration (Demo)
8. Agarose gel electrophoresis to separate DNA
9. SDSPAGE
10. ligation
11. Restriction digestion
12. Bacterial transformation
13. Western blotting technique

SEMESTER-V

Sub Code : PLANT BIOTECHNOLOGY 56 hours

Course Outcomes: After completing this course, the student is expected to learn the following:

CO 1. Demonstrate a comprehensive understanding of plant biology, physiology, genetics, andmolecular biology.

CO 2. Explore methods of introducing foreign genes into plants through transformation techniques.

CO 3. Gain practical skills in plant tissue culture for improvement.

CO 4. Design strategies for plant genetic manipulation against biotic and abiotic stressors.

CO 5. Hypothesize strategiesto increase plant yield and fruit/seed quality.

CO 6. Apply biotechnological tools and techniques used in plant research and agriculture, such asplant tissue culture, genetic engineering and transgenics.

CO 7. Execute plant tissue culture techniques for callus induction, somatic embryogenesis, andmicropropagation, and apply them in plant breeding and propagation.

CO 8. Perform plant transformation methods and demonstrate the ability to introduce foreign genesinto plants using different techniques.

CO 9. Apply knowledge about ethical considerations and regulatory frameworks associated with plant biotechnology and genetically modified crops.

Unit I (14 hours)

History of plant tissue culture, technical terms and definitions in tissue culture. Establishing sterile cultures - plant tissue culture lab set up, sterilization methods for instruments and explants. Tissue culture media, plant growth regulators. Principles, methodology and applications of clonal or micropropagation– axillary bud culture, shoot tip culture, mesistem and mericlone culture. Haploid culture-principle, protocol and applications. Embryo culture – types, principle, protocol and applications. Embryo rescue.

Unit II (14 hours)

Callus induction, introduction to the process of embryogenesis- types and organogenesis. Synthetic seeds- principle, protocol and applications. Somaclonal variations- introduction, types, process, factors affecting process and applications. Single cell suspension cultures - types, methods, viability tests and applications. Secondary metabolites - introduction, classification, production *invitro* methods and applications. Cryopreservation of plant tissues -introduction, principle, types, protocol and applications.

Unit III (14 hours)

Protoplast-introduction, principle ;isolation methods-mechanical, enzymatic. CPW medium, source of enzymes. Isolation of protoplasts from intact tissue, callus, suspension cultures and haploid cells - protocols. Testing the viability of isolated protoplasts. Various steps and methods involved in the regeneration of protoplast. Markers used in the selection of hybrid cells. Somatic hybridization - introduction, principle, protocol; hybrids and cybrids. Protoplast fusion methods: chemical and electrical. Applications of protoplasts, hybrids and cybrids.

Unit IV **(14 hours)**

Genetic manipulations of plant cells- single cells, protoplasts protocols and applications. Structure of *Agrobacterium tumefaciens*, tumour formation in monocots and dicots, reporter genes used in genetic transformations. Root formation using *Agrobacterium rhizogenes*and applications. Genetic transformation – transgenic cotton, edible vaccines and transgenic brinjal: protocol and applications. GM food and ethical issues.

Diseases development in plants caused by bacteria (bacterial blight or rice), fungi (late blight of potato), virus (tobacco mosaic disease) classification, symptoms, disease cycle and control measures.

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Russell, G.E.1988.*Biotechnology of Higher Plants*. Intercept Publications.

Srivatsava P.S.*Plant tissue culture and Molecular Biology*: Applications and prospects. Narosa Publishing House, New Delhi.

Sub Code : PLANT BIOTECHNOLOGY PRACTICAL

1. Plant tissue culture laboratory set up
2. Different plant tissue culture media
3. Methods of sterilization of glass ware, media and explants
4. Establishment of callus culture, seed, embryo culture
5. Anther and pollen culture
6. Clonal propagation-shoot tip and axillary bud culture
7. Establishment of suspension culture
8. Protoplast isolation and culture
9. Somatic embryogenesis and artificial seeds
10. Organogenesis from callus culture, and hardening of plantlets
11. Isolation of *Agrobacterium* from plants or soil and *in vitro* culture
12. Cocultivation of *Agrobacterium* with plant of interest
13. Cryopreservation methods

Sub Code : ANIMAL BIOTECHNOLOGY 56 hours

Course Outcomes: After completing this course, the student is expected to learn the following:

CO 1. To learn the fundamental aspects of animal biotechnology.

CO 2. Discuss about biotechnological tools and techniques used in animal research.

CO 3. Understand the biology and characterization of cultured cells, including their adhesion, proliferation, differentiation, morphology, and identification.

CO 4. Gain practical skills in basic mammalian cell culture techniques, measuring growth parameters, assessing cell viability, and understanding cytotoxicity.

CO 5. Learn about germplasm conservation techniques and the establishment of gene banks, along with large-scale culture methods for cell lines.

CO 6. Explore methods of introducing foreign genesinto animals through transformation techniques..

CO 7. Explore organ and histotypic culture techniques, biotransformation, 3D cultures, whole embryo culture, somatic cell cloning, and the ethical considerations surrounding stem cells and their applications

CO 8. Apply knowledge to real-world challenges in veterinary medicine, conservation, and biomedical research

CO 9. Understand the need for animal biotechnology for human welfare.

Unit I (14 hours)

History of the development of cell culture. Contributions of R.G.Harrison, Alexis Carrel. Hanging drop technique, watch glass technique. Equipments and materials for animal cell culture. Essential, beneficial and useful equipments. Substrates (glass, plastic, treated surface, feeder layer).

Animal cell culture media. Media for immediate survival of cells (BSS). Media forprolonged survival of cells (natural and artificial). Natural media - embryo extract, lymph serum; artificial (defined) media- media with serum and media without serum. Importance of serum in culture media.

Basic techniques of mammalian cell culture *in vitro*: primary explants culture - technique, advantages and disadvantages; primary cell culture - technique. Disaggregation of tissue: trypsinization - cold and warm, collagenase treatment, mechanical methods. Measurement of cells - cell count and cell viability. Cell counting - hemocytometer, electronic cell counter; cell viability - trypan blue, MTT assay.

Cell separation techniques - density gradient centrifugation, MACS, FACS.

Maintenance of cell culture: medium change-need, method; sub culturing – factors affecting, methods - monolayer and suspension culture.

Unit II (14 hours)

Cell lines: types (finite and continuous), characteristics, examples for commonly used cell lines - BHK 21 - C13, HeLa. Routine maintenance – medium change, sub culturing.

Growth kinetics of cells in culture: growth curve–lag, log, stationary and plateau phase; PDT, multiplication rate, generation number.

Measurement of cell proliferation- MTT assay, ^{3}[H]:thymidine incorporation. Cell synchronization: methods - chemical blockade (^{3}H: thymidine: double thymidine block, colcemid, vinblastin sulfate), low temperature procedure, starvation, centrifugation. Somatic

cell fusion techniques: chemical/virus mediated, elctrofusion, Production of MAbs by hybridoma technology : technique, applications of MAbs. Selection of hybrids: HAT selection; cell cloning- types: dilution and suspension (agar gel and methocis). Stem cell cultures: types- totipotent, pluripotent, multipotent, unipotent; embryonic and adult. Cryopreservation - technique (freezing and thawing) and applications.

Unit III **(14 hours)**

Animal cloning- reproductive cloning (Dolly- nuclear transplantation), therapeutic cloning (Xeno transplantation). Gene transfer methods (transfection): chemical methods- $CaPO_4$ co precipitation, DEAE dextran mediated, lipofaction; physical - microinjection, electroporation; biological method – retroviral infection. Reporter genes - GFP, antibiotic resistance markers (neomycin phosphotransferase). DNA microarray - method, applications. Gene therapy - somatic and germline. Somatic (SCID), gene therapy in cancer treatment (TNF gene, p53 gene replacement).

Study of animal diseases: Symptoms, disease diagnosis and treatment of AIDS, salmonellosis and Candidiasis and malaria.

Unit IV **(14 hours)**

Genetic engineering - Factor VIII, tissue plasmogen activator (tPA), hormones (growth hormone, insulin), hepatitis B vaccine. Organ culture (3 dimensional cultures): methods- watch glass technique, raft method, agar gel method, grid method cyclic exposure to light and gas phase. Tissue engineering (artificial skin): methods-collagen method and mesh scaffolding method. Transgenic animals:transgenic cattle - tPA, AAT production; Animals as bioreactors (biopharming): mammary glands asbioreactors- production of regulatory proteins (alpha -1- antitrypsin[AAT], tPA), Silk worm as bioreactors: heterologus proteins (OFP, human growth hormone) transgenic fish– GH induced fish, AFP (fish antifreeze protein) - method and production.

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Houdebine LM.2003. *Animal Transgenesis and Cloning*. John Wiley &Sons.

Ian Freshney R. 2000.*Culture of Animal Cells*: A Manual of Basic Technique 4th edition. Wiley-Liss.

Panno J. 2005. *Animal Cloning*: The Science of Nuclear Transfer. Factson File Inc.

Sub Code : ANIMAL BIOTECHNOLOGY PRACTICAL

1. Lab set up and fumigation of the lab
2. Preparation and filtration of animal tissue culture media
3. Primary explants culture
4. Chick embryo culture (Spratt culture)
5. Isolation of bone marrow cells by flushing and primary culture
6. Culture of lymphocytes
7. Determination of viability of cells
8. Buffy coat preparation of WBC
9. Mammalian cell counting by Hemocytometer
10. Estimation of viability of cells by trypan blue dye exclusion
11. Staining for monolayer culture and suspension culture
12. Cryopreservation

SEMESTER-VI

Sub Code :BIOPROCESS AND ENVIRONMENTAL BIOTECHNOLOGY

56 hours

Course out comes: After completing this course, the student is expected to learn the following:
CO1. Exploitation of microorganisms for industrial use and their improvement, and formulation of media for efficient growth and production of microbial or cell-based products.
CO 2. The design, operation, and specific applications of various bioreactors.
CO 3. Demonstrate a comprehensive understanding of the fundamental concepts and principlesof environmental biotechnology.
CO 4. Apply knowledge of biotechnological techniques to address environmental challenges,such as pollution control and waste management.
CO 5. Analyze and evaluate environmental biotechnology case studies, research findings, andreal-world applications.
CO 6. Design and implement biotechnological approaches for environmental remediation,utilizing microbial processes and biodegradation principles.
CO 7. Evaluate the ethical and sustainable aspects of environmental biotechnology practices andmake informed decisions regarding their application in environmental conservation.
CO 8. Communicate scientific concepts and research findings related to environmentalbiotechnology effectively, both in written and oral forms, to diverse audiences

Unit I (14 hours)

Basic principle components of fermentation technology. Strain improvement of industrially important microorganisms. Types of microbial culture and its growth kinetics– Batch, Fed-batch, and Continuous culture. Principles of upstream processing – Media preparation, Inocula development, and sterilization.

Unit II(14 hours)

Bioreactors- Significance of Impeller, Baffles, Sparger; Specialized bioreactors- design and their functions: airlift bioreactor, membrane bioreactors, fluidized bed reactor, packed bed reactors Downstream processing- cell disruption, precipitation methods, solid-liquid separation, liquid-liquid extraction, filtration, centrifugation, chromatography, drying devices (Lyophilization and spray dry technology), crystallization, Microbial production of amylase and Single Cell Proteins.

Unit III(14 hours)

Basic principles of environmental biotechnology and its relevance to environmental protection: definition, its role in waste management, manufacturing process and pollution control.

Microbiological treatment solid wastes: composting, vermicomposting, Biological treatment of liquid wastes (sewage): primary treatment, secondary treatment (activated sludge system, trickling filters), sludge digestion, septic tanks, oxidation ponds. Tertiary treatments.

Bioremediation: Importance of bioremediation in environmental cleanup. Types of contaminants suitable for bioremediation. Microorganisms used in bioremediation. *In-situ* Bioremediation Methods. – Bioaugmentation. Biostimulation. Bioventing. Phytoremediation. *Ex-situ* Bioremediation Methods – Composting, Land farming, Biopile and bioslurry systems.

Unit IV **(14 hours)**

Conventional and non-conventional sources of energy. Methanogenic bacteria and biogas, microbial H_2 production, bioethanol production. solar energy and solar energy converters, wind and tidal energy and its utilization. Coastal regulatory zone (CRZ). Energy gardens - *Pongamia*and *Jatropha.*

Microbial degradation of xenobiotics: pesticides, detergents, plastics. Degradation of organic compounds: hydrocarbon. eutrophification, biomagnification Biomining (e.g. copper and gold)..Biocontrol agents: Bacterial, viral, fungal of plants as Biopesticides. Biofertilizers: utilization of Rhizobia, cyanobacteria, arbuscular mycorrhizae.

References

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
3. Patel AH. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.
4. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.
5. Colin Ratledge and Bjorn Kristiansen, Basic Biotechnology (3rd Edn.).2022
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9. Jogdand SN.2010. *Environmental Biotechnology.*Himalaya Publishing House, Bangalore, New Delhi.
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11. OdumEP.and BarrettGW.2004. Fundamentals of Ecology WB. Saunders Co., Philadelphia and London.
12. SubbaRao N.S.1974. *SoilMicrobiology*, 4th edition, Oxford & IBH Publishers, New Delhi
13. Wang LK, Ivanov V, Tay JH and Hung YT. 2010.*Environmental Biotechnology.* Sringer publishers.

Sub Code : BIOSTATISTICS AND BIOINFORMATICS 56 hours

Course Outcomes: After successful completion of this Course, students will be able to:
CO 1: Describe the scope and importance of biostatistics and explain types of data their presentation in easily understandable way.
CO 2: Demonstrate analysis of data using different statistical methods which helps to draw inference from the data
CO3: Explain the organization and working of computers and illustrate the use of computers in biological science especially in automated control of fermenters
CO 4: Describe the scope and importance of bioinformatics and demonstrate the use of basic bioinformatics tools for analysis of biological data
CO 5: Discuss biological databases, their types and importance and discuss the applications of bioinformatics in biology

Unit I(14 hours)

Biostatistics: Definition and Importance;

Data: Definition, Types: Qualitative Data and Quantitative Data, Categories of Data: Primary Data, Secondary Data

Classification and Tabulation of Data

Frequency Distribution: Discrete Frequency Distribution, Continues Frequency Distribution

Presentation of Data: Bar Diagram, Histogram, Line diagram, Pie chart

Measures of central tendencies: definitions with examples- mean, mode, median, Geometric mean, Harmonic mean

Unit II (14 hours)

Measures of dispersion: definitions with examples - range, quartile deviation, mean deviation, standard deviation

Probability: definition, sample space, event, complement of an event, subevent, union of events. Introduction of events, equally likely events, mutually exclusive and exhaustive events with illustrations.

Correlation: definition, types of correlation, Karl Pearson's coefficient of correlation, Spearman's rank correlation.

Regression: definition, regression equations, properties of regression equations with problems

Unit III (14 hours)

Introduction to computer and organisation of computers: Hardware CPU, memory, input device, output device, memory Modules, RAM;ROM-different types: Flash memory, Auxiliary storage, Magnetic device, optical device, floppy device, hard disk, CD,DVD.

Digital and analogue computers,

Computer algorithm, computers in monitoring and automation.

Application of computers in coordination of solute concentration, pH and temperature of fermentors. Computers as computational tools for bioinformatics

Unit IV (14 hours)

Bioinformatics – An Overview: Definition, Scope, Importance of Bioinformatics in Biological Research, History of Bioinformatics. Bioinformatics and its relation with molecular biology Examples of related tools (FASTA, BLAST, RASMOL)

Biological Databases: Definition, Types: Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary) Database Management System (DBMS).

Sequence analysis: Pairwise and multiple sequence alignment

Biological Data visualization: PyMol,Cn3D. Application of bioinformatics in agriculture, pharmacogenomics and aquaculture.

References

Arnold E. 1979. Introductory statistics for Biology 2 nd edition, London.
Attwood T and Parry-Smith D. 1999. Introduction to Bioinformatics. Prentice Hall Publications.
Lewis AE. 2010. Biostatistics. Prentice Hall. New Jersey. Parker RE.
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Zar J. H. 1974. Biostatistical analysis. Prentice Hall, New Jersey

Sub Code : BIOPROCESS, ENVIRONMENTAL BIOTECHNOLOGY, BIOSTATISTICS AND BIOINFORMATICS PRACTICAL

1. Estimation of alkalinity and salinity from water, soil or sewage
2. Determination of BOD and COD
3. Estimation of hardness of water
4. Estimation of total solids, dissolved and suspended solids
5. Estimation of inorganic phosphate and nitrogen in soil, sewage and water
6. Estimation of dissolves oxygen and carbon dioxide
7. Estimation of organic carbon.
8. Analysis of polluted water
9. Bacterial growth curve
10. Calculation of the thermal death point (TDP) of a microbial sample.
11. Study of fermentor- Demonstration.
12. Production of wine
13. Estimation of the percentage of alcohol, total acidity & volatile acidity in wine.
14. Production and analysis of amylase.
15. Production and analysis of lactic acid.
16. Problems in biostatistics
17. Problems in bioinformatics

Sub Code :Project

MANGALORE UNIVERSITY
MANGALURU

B. Sc. MICROBIOLOGY
SYLLABUS

With Effect from 2024-25

Ist & IInd Semester

DISCIPLINE SPECIFIC CORE COURSE (DSC) FOR SEM I – II

(SEP MODEL – 2024)

Board of Studies in Microbiology
Department of Studies in Microbiology
Mangalore University
Mangalagangothri, Konaje- 574 199
Karnataka, India

15/7/24

15/07/2024

15/7/24

15/7/24

Approved

Dr. M. JAYASHANKAR
Senior Professor in Microbiology
Dean: Faculty of Science and Technology
Mangalore University

MANGALORE UNIVERSITY

B.Sc MICROBIOLOGY

(Effective from 2024- 2025)

SUBJET TITLES, SCHEME FOR INSTRUCTION AND EXAMINATION

SEMESTER SCHEME

Paper Code	Title of the Paper	Type of paper	Periods/ Week	Duration of Exam (Hours)	IA	EA	Max. Marks	Credits
FIRST SEMESTER								
101	Fundamental Microbiology	Theory	4	3	20	80	100	3
102	Fundamental Microbiology	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**150**	**5**
SECOND SEMESTER								
201	Microbial Taxonomy and Culture Techniques	Theory	4	3	20	80	100	3
202	Microbial Taxonomy and microbial Culture Techniques	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**150**	**5**
THIRD SEMESTER								
301	Basic Biochemistry ,Microbial Physiology and Genetics	Theory	4	3	20	80	100	3
302	Microbial Biochemistry, Physiologyand Genetics	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**150**	**5**
FOURTH SEMESTER								
401	Molecular Biology, Biostatistics and Bioinformatics	Theory	4	3	20	80	100	3
402	Molecular Biology, Biostatistics and Bioinformatics	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**150**	**5**

Paper Code	Title of the Paper	Type of paper	Periods/ Week	Duration of Exam (Hours)	IA	EA	Max. Marks	Credits
FIFTH SEMESTER								
501	Medical Microbiology and Immunology	Theory	4	3	20	80	100	3
502	Agricultural Microbiology and Plant Pathology	Theory	4	3	10	80	100	3
503	Medical and Agricultural Microbiology	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**250**	**08**
SIXTH SEMESTER								
701	Food and Industrial Microbiology	Theory	4	3	20	80	100	3
702	Environmental Microbiology	Theory	4	3	20	80	100	3
703	Industrial and Environmental Microbiology	**Practical**	4	3	10	40	50	2
Total Marks and Credits							**250**	**08**
Total Marks and Credits (All Six Semesters)							**1100**	**36**

Program Outcomes:

Competencies need to be acquired by the candidate securing B.Sc. (Basic) or B.Sc. (Hons)

By the end of the program the students will be able to:

1. Knowledge and understanding of concepts of microbiology and its application in **pharma, food, environment, medical field, agriculture, beverages, nutraceutical industries**.
2. Understand the distribution, morphology and physiology of microorganisms and demonstrate the skills in aseptic handling of microbes including isolation, identification and maintenance.
3. Competent to apply the knowledge gained for conserving the environment and resolving the environmental related issues.
4. Learning and practicing professional skills in handling microbes and contaminants in laboratories and production sectors.
5. Exploring the microbial world and analyzing the specific benefits and challenges.
6. Applying the knowledge acquired to undertake studies and identify specific remedial measures for the challenges in health, agriculture, and food sectors.
7. Thorough knowledge and application of good laboratory and good manufacturing practices in microbial quality control.

8. Understanding biochemical and physiological aspects of microbes and developing broader perspective to identify innovative solutions for present and future challenges posed by microbes.
9. Understanding and application of microbial principles in forensic and working knowledge about clinical microbiology.
10. Demonstrate the ability to identify key questions in microbiological research, optimize research methods, and analyze outcomes by adopting scientific methods, there by improving the employability.
11. Enhance and demonstrate analytical skills and apply basic computational and statistical techniques in the field of microbiology.

Course Outcomes (COs):

At the end of the course the student should be able to learn:

1. **Thorough knowledge and understanding of concepts of microbiology.**
2. **Learning and practicing professional skills in handling microbes.**
3. **Thorough knowledgeand application of good laboratory and good manufacturing practices in microbial quality control.**

SCHEME OF THEORY EXAMINATION

All Sections are compulsory. Illustrate/Draw wherever necessary

Time 3 Hours		**Max. Marks 80**
Section A		
Write briefly on **any ten** of the following	2x10=20	1 – 12 questions
Section B		
Write short notes on **any four** of the following	4 X 5 = 20	13-18 questions
Section C		
Answer **any four** of the following	4 X 10 = 40	19-24 questions

SCHEME OF PRACTICAL EXAMINATION

Time 3 hours			Max. Marks 40
Question No.	**Experiment**	**No. of Questions and Marks**	**Marks**
1	Major Experiment	Experiment **1** = 12 marks	12
2	Minor Experiment	Experiment **2** = 08 marks	08
3	Spotters	4 spotters X 3 marks = 12 marks	12
4	Record & Viva-voce	4+4= 08 marks	08
		Total marks	**40**

SCHEME OF INTERNAL ASSESSMENT

Assessments	**Theory Examination**	**Practical Examination**	**Elective**
Tests	10	05	05
Seminar	05	05	05
Assignment	05	00	00
Total	**20**	**10**	**10**

Question Paper Pattern of all semester.

1. All Sections are compulsory
2. Illustrate/Drew diagrams wherever necessary

Section – A

Write briefly **any Ten** of the following: 10x2= 20

Q. 1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

Section – B

Write Short notes on **any Four** of the following 4x10= 40

13.

14.

15.

16.

17.

18.

Section – C

Answer **any Four** of the following 4x10= 40

19.

20.

21.

22.

23.

24.

Questions shall be selected from all the units of the syllabus for all sections of the question papers.

Internal Assessment (Theory)

1. Two theory tests to be conducted for 20 marks and converted in to 10 marks
2. Assignments - 05 marks
3. Seminars - 05 marks

Total = 20 marks

Internal practical assessment - 10 marks

One practical test to be conducted

Question paper pattern for Practicals :

Q-1: Perform Major Experiment Performa selected by lots 1x12=12

Q-2: Perform Minor Experiment selected by lots 1x8=8

Q-3: Identify the given spotters with reasons (a, b, c) 4x3=12

Q-4: Viva & Record submission 4+4= 8

Total = 40 Marks

Mangalore University
Under Graduate Programme in Microbiology
Syllabus for 1th and 2th Semester
(B.Sc in MICROBIOLOGY)

Program Name	BSc in MICROBIOLOGY		Semester	I
Course Title	Fundamental Microbiology (Theory)			
Course Code:	MIC T 1	No. of Credits		03
Contact hours	56 Hours Theory	Duration of EA Exam		3 Hours
Formative assessment	20	Summative assessment		80

I SEMESTER

101 Fundamental Microbiology (Theory)

Total 56hrs -4 hrs/week

UNIT I: History & Scope of Microbiology: 14hrs

- Origin of life and evolution of Microorganisms. History and scope of Microbiology as a modern science-..Microorganisms-Types and significance in general (Beneficial and Harmful). Branches of Microbiology
- Contribution of Antony Von Leuwenhoek, Edward Jenner, Lazaro Spallanzani, Louis Pasteur, Joseph Lister, Robert Koch, Alexander Fleming and lwanovsky to Microbiology.
- Contribution of M. S. Swaminathan, Har Gobind Khorana, Ananda Mohan Chakrabarty.

UNIT II: Microscopy and Staining Techniques 14hrs

- Microscopy: Principles of Microscopy-Magnification, Resolving power, Numerical aperture, Tube length and Focal length of compound Microscope.
- Principle, construction, working and applications of a) Compound microscope c) Phase Contrast microscope d) Fluorescent Microscope e) Electron Microscope -TEM and SEM
- Stains, Types of stains, General procedure of staining of bacteria and fungi.

  a) Simple staining and negative staining b) Differential Staining- Grams and Acid fast staining c) Structural staining – cell wall, endospore, and capsular staining

UNIT III: Sterilization Techniques 14hrs

- Definition of terms-sterilization, disinfectant, antiseptic, sanitizer, germicide, micro biostatic agents, micro biostatic agents and antimicrobial agent.
- Physical methods of sterilization-Heat–a) Dry heat–Hot Air Oven and Incineration b) Moist heat, Autoclave,PressureCooker.c)Tyndallization(fractionalsterilization). Filtration–Types offilters, laminar airflow. Radiationmethods:UV rays and cathode rays.
- Chemical methods of sterilization: Use and mode of action of Alcohol, aldehydes, phenols,
- halogen, Heavy metal and metallic salts, Quaternary ammonium compounds and sterilizing
- gases as Antimicrobial agents.

UNIT IV: Microbial Nutrition **14hrs**

- Nutritional requirements of microorganisms-Macronutrients, micronutrients and growth factors. Nutritional types of microorganisms: Autotrophs and heterotrophs, phototrophs and chemotrophs. Physical factors affecting growth of microorganisms: Temperature, pH and Oxygen. Growth rate and generation time, Bacterial growth curve – phases of growth and their significance. Diauxic and synchronous growth, Continuous and batch cultivation.
- Measurement of growth -Direct Microscopic count, Hemocytometer, viable count, Membrane filtration, Electronic coulter counting method. Measurement of cell mass. Chemostat and Turbidostat-Batch and continuous culture
- Nutrient transport-passive, facilitated active and group translocation

REFERENCES

1. Black J. G. and Black L. J. (2017) Microbiology – Principles and Explorations, 10 th ed. John Wiley & Sons Inc. New York, USA.
2. Dubey R. C. And Maheshwari D. K. (2022) A Text Book of Microbiology, 5 th ed. S. Chand & Company Ltd.
3. Madigan M. T., Martinko J. M., Bender K. S., Buckley D. H., Sattley W.M, Stahl D. A. (2021). Brock biology of micoorganisms, 16 th ed. Pearson, Boston.
4. Michael Pelczar, Jr., Chan E. C. S., Noel Krieg. (2023). Microbiology. 5 th ed. Affiliated East West Press Private Ltd.
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7. Willey J. M., Sherwood L., Sandman K., & Wood D. (2022) Prescott's Microbiology. 12 th ed. McGraw – Hill Higher Education.

I[st] SEMESTER

102: I SEMESTER PRACTICAL

Course Title	**Fundamental Microbiology (Practical) Sem- I**	Practical Credits	**02**
Course Code	**MIC P-1**	Contact Hours	**4 Hours/ week**
Formative Assessment	**10 Marks**	Summative Assessment	**40 Marks**

1. Safety measures in Microbiology Laboratory
2. Study of compound microscope- Construction, working, principle, care to be taken while using the microscope. Useof oil immersion objective.
3. Study of instruments-Autoclave, Hot air oven. Laminar air flow chamber, Colony counter, Inoculation loop and needle, Incubator, Centrifuge, pH meter, and colorimeter/spectrophotometer.
4. Study of aseptic techniques, preparation of cotton plugs for test tubes and pipettes,wrapping of Petri plates and pipettes, transfer of media and inoculum.
5. Cleaning and sterilization of glass wares
6. Simple staining technique for bacteria
7. Negativestainingtechnique
8. Gram'sstainingTechnique
9. Endospore staining Technique
10. Staining and mounting of Algae
11. Staining and mounting of Fungi.
12. Study of bacterial motility by hanging drop technique

SEMESTER II

Program Name	BSc in MICROBIOLOGY	Semester	II
Course Title	Microbial Taxonomy and Culture Techniques (Theory)		
Course Code:	MIC T-2	No. of Credits	03
Contact hours	56 Hours	Duration of EA Exam	3 Hours
Formative assessment	20	Summative assessment	80

Total 56hrs -4 hrs/week

UNIT I: Bacterial Taxonomy and Diversity 14hrs

Criteria for classification of prokaryotes – Morphological, Physiological, Biochemical. Chemotaxonomy and Numerical taxonomy. A brief account on Bergey's manual of systematic bacteriology. Cladograms and Genograms.

Bacteriology- General characteristics of bacteria, cell structure Size, Shape and arrangement of bacterial cells, Fine structure, composition and function of bacterial cell wall, cell membrane, cytoplasm, nucleoside, flagella, Pili/fimbriae, slime layer, capsule, spores, cysts and reproduction. Classification of Bacteria, reproduction of bacteria. General characteristics and significance of Rickettsia, Chlamydia, Mycoplasma, Actinomyces, Brief account on Archaea.

UNIT II: Fungal and Viral Taxonomy and Diversity 14hrs

- **Classification of Viruses**, (Baltimore & ICTV) Ultrastructure of viruses – capsid symmetry, envelope, enzymes and genome. Structure, replication and significance of – Bacteriophage (T 4 and Lambda), Herpes (Enveloped), Polyoma virus (Icosahedral), Adeno virus (DNA genome) and HIV (RNA genomeand reverse transcriptase enzyme).
- Brief account on - Cyanophages and mycophages, acellular entities – Viroids and Prions.
- Brief history of Mycology, General characteristics, structure and organization of fungi. Classification of fungi(Alexopoulos and Mims) Fungi: General aspects of fungal nutrition. Reproduction and significance of major groups of fungi (Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes). Type study (Aspergillus, Rhizopus, Penicillium, Trichoderma and Yeast)

UNIT III: Taxonomy and Diversity of Algae and Protozoa 14hrs

- Algae:Introduction, Classification of Algae (G. M. Smith), general structure and reproduction (Vegetative, Asexual and Sexual).Type study-Chlamydomonas, Volvox and Spirogyra
- General characteristics, cell structure and reproduction ofCyanobacteria -Type study of Anabaena and Spirulina.Parallelismbetweenbacteria andcyanobacteria.
- Protozoa: General features and significance. Type study -Amoeba and Plasmodium.

UNIT IV: Microbial Culture Media and Culture Techniques 14hrs

- Synthetic and non-synthetic – solid, liquid and semisolid media. Special media – Enriched, Selective, transport, differential, maintenance (NA, PDA, YEMA, SDA, MacConkey's agar,

Blood agar, Chocolate agar, EMB, Cary Blair's media, RCM, VR medium).

- Methods of isolation of bacteria and fungi. Streak plate, spread plate method, Serial dilution technique, Slide culture technique, Cultivation of Anaerobic bacteria. Strain selection and improvement technique. Preservation and maintenance of cultures. Microbial culture collection centers.Media and methods used for cultivation of algae, large scale cultivation. Cultivation and assay of Viruses.

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8. Marjorie Cowan, Kathleen Park Talaro (2009). Microbiology: A Systems Approach. 2 nd ed. The McGraw Hill. New York.
9. Mehrotra R. S., and Aneja K. R. (2015). An Introduction to Mycology. New Age Publications.
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12. Sharma O.P. (2023). Fundamentals of Algae, 3 rd ed. MedTech. Science Press.
13. Sullia S. B. and Shantharam S. (2000). General Microbiology (Revised) Oxford & IBH Publishing Co. Pvt. Ltd., India.
14. Tortora G. J., Funke B. R., Case C. L., Warner B.B., Weber D. (2023). Microbiology an Introduction, 14 th ed. Pearson Education Pvt. Ltd.
15. Vashishta B. R., Sinha A.K., Singh V.P. (2010) Botany for Degree Students – Algae. Rev. Ed. S.Chand& Company Ltd.
16. Vashishta B. R., Sinha A.K., (2016) Botany for Degree Students – Fungi. Rev. Ed. S.Chand& Company Ltd.
17. Willey J. M., Sherwood L., Sandman K., & Wood D. (2022) Prescott's Microbiology.12 th ed. McGraw – Hill Higher Education.

SEMESTER II: Practical II

Course Title	Microbial Taxonomy and Culture Techniques **(Practical) Sem- II**	Practical Credits	**02**
Course Code	**MIC P-1**	Contact Hours	**4 Hours/ week**
Formative Assessment	**10 Marks**	Summative Assessment	**40 Marks**

1. Preparation of media-Nutrient broth, Nutrient Agar, SDA/ PDA/Mc Con keys Agar
2. Isolation of microorganisms: Spread plate, Streaking technique, Swab technique and point inoculation
3. Isolation of bacteria bySerialdilution and Pourplatingtechnique
4. Study of Morphological characterization of Gram positive and Gram negative bacteria.
5. Measurement of size of cells by Micrometry
6. Enumeration of microorganisms by Hemocytometer
7. Study of Bacterial growth curve .
8. Study of effect of pH and temperature on bacterial growth
9. Study of Slide culture technique.
10. Type study of *Aspergillus, Penicillium , Yeast, Rhizopusand Fusarium*(Specimens)
11. Study of protozoa-Amoeba, Paramaecium and Euglena.(Permanent slides)
12. Study of Blue green algae-*Nostoc, Oscillatoria* and *Spirulina.*(Specimens)

Programme Structure of Economics

SL NO	Course Code	Title of the Course	Cat. Of the Course	Teach ichng. Hours /Week	Sem. Exam	IA	Total Marks	Credits
Semester I								
		Foundations of Microeconomics	Theory	6	80	20	100	5
Semester II								
		Foundations of Macroeconomics	Theory	6	80	20	100	5

MANGALORE UNIVERSITY

PROGRAM OUTCOME- BACHELOR OF ARTS (BA)

Curriculum framework of Undergraduate program of Bachelor of Arts (BA) in Economics are:

1. The core objective of the program is to prepare graduates with employable skills leading to diverse career paths in fields such as banking, finance, consulting, government agencies, non-profit organizations, and academia. Graduates may work as economists, financial analysts, policy analysts, market researchers, or in roles that require strong analytical and problem-solving abilities.
2. Graduates will have a solid understanding of economic principles, theories, and concepts such as supply and demand, market structures, fiscal and monetary policy, international trade, and economic development etc.
3. Students will develop analytical skills allowing them to critically evaluate economic data, trends, and policies.
4. Economics emphasizes quantitative methods such as mathematical economics, and statistics, enabling graduates to use mathematical and statistical tools to analyze economic issues.
5. Graduates are prepared to analyze economic policies and their implications on various sectors of the economy, including budget, government policies, business strategies, and international relations.
6. Graduates are prepared to pursue advanced degrees such as Master's or PhD programs in Economics, Finance, Public Policy, or related fields to deepen their knowledge and enhance their career prospects. Overall, a BA in Economics provides graduates with a strong foundation in economic theory and practical skills that are applicable across various industries and sectors of the economy.

MANGALORE UNIVERSITY

Composition of Board of Studies

Sl.No	Name & Organization	Designation
1	Dr. Viswanatha Senior Professor, Mangalore University, Konaje	Chairman
2	Dr. Prakasha Rao A. Associate Professor, Poorna Prajna College Udupi- 576101	Member
3	Sri. Hareesha Acharya P. Associate Professor, Govinda Dasa College Surathkal, Mangalore	Member
4	Dr. Sreenivasaiah K., Assistant Professor, Government Women's First Grade College, Balmatta Mangalore	Member
5	Dr. E. Thippeswamy Professor, Field Marshal K.M. Cariappa College, Madikeri-571201	Member
6	Sri. Ashok Jogi Assistant Professor, E.C.R. Institute of Management Studies Brahmavar	Member

MANGALORE UNIVERSITY

Program Name	**BA in Economics**	Semester	**First Semester**
Course Title	**Foundations of Microeconomics**	No. of Credits	**5**
Course Code:	**SEP ECO 01**	Hours per Week	**6**
Contact hours	**72 Hours**	Duration of SEA/Exam	**3 hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Understand introductory economics concepts.

CO2. Recognize basic supply and demand analysis and to enable students to act more effectively and responsibly as consumers, producers and citizens

CO3. Recognize the structure and the role of costs in the economy.

CO4. Describe, using graphs, the various market models: perfect competition, monopoly, monopolistic competition, and oligopoly.

CO5. Identify problem areas in the economy, and possible solutions, using the analytical tools developed in the course.

CO6. Appreciate the understanding and the application of framework in order to frame the economic model closer to reality

Contents	72 Hrs
Module - I: INTRODUCTION TO ECONOMICS- Definitions of Economics- Scarcity & Growth Oriented- Scope & Subject matter- Microeconomics and macroeconomics- Basic Economic Problems- Production Possibility Curve- Economic Laws - Price Mechanism.	**10**
Module - II: CONSUMER BEHAVIOUR ANALYSIS- Cardinal Utility Analysis - Law of diminishing marginal utility- Law of Equi-marginal Utility– Consumers Surplus- Ordinal Utility Analysis- Indifference Curve Analysis- Indifference Schedule - Curve, Map – Properties of Indifference Curve- Marginal Rate of Substitution- Budget line – Consumer's Equilibrium.	**12**

EMAND ANALYSIS Meaning, Demand Function - Determinants - Law of demand- Reasons for the on of the law of demand- Exceptions to the law of demand; Changes in Demand & nges in Quantity Demanded; Elasticity of Demand, Types- Price, Income, Cross Elasticity, Price Elasticity of Demand- Degrees of Price Elasticity of Demand- Methods of Measurement	12
Module - IV: SUPPLY, COST AND REVENUE ANALYSIS Supply- meaning, supply and stock, Determinants of supply - Law of Supply, exceptions. Cost concepts- Cost- Output relationship- Short run & Long run. Revenue Concepts- Revenue Curves under perfect & imperfect market.	12
Module- V: ECONOMIC FUNCTIONS AND APPLICATIONS. Demand Function, Supply function, Production function, Cost, Revenue and Profit function. Graph of Economic Functions, Market equilibrium; Equilibrium price and Quantity, Impact of specific tax and subsidy on market equilibrium. Calculation of Elasticity of Demand.	14
Module -VI: MARKET ANALYSIS Market- Meaning- Perfect Competition- Features- Price & Output Determination; Monopoly- Features- Price & Output Determination- Discriminating Monopoly- Types - Equilibrium under Discriminating Monopoly; Monopolistic Competition- Features- Price & Output Determination- Oligopoly- Types & Features	12

Pedagogy: Classroom lecture, tutorials, Problem solving exercise

Formative Assessment for C1 & C2		
Assessment	**Marks**	
	C1	**C2**
Internal Test	10	10
OR		
Internal Test	10	
Assignment & Seminar		5+5=10
Total	**20 Marks**	
Formative Assessment as per SEP guidelines are compulsory		

	References
	ija, H.L. (2011): *Principles of Microeconomics*, S. Chand and Co., New Delhi
	Mankiw, N. Gregory (2020). *Principles of Economics* (Ninth ed.). Boston, MA.
3	Jhingan, M.L. (2016): *Microeconomics*, Vrinda Publications, New Delhi
4	Koutsoyiannis, A (1979): *Modern Microeconomics*, London, Macmillan
5	K.N Verma -Micro Economic theory- Published by Vishal Publishing Company. Jalandhar
6	Samuelson, Paul (2004): *Economics*, McGraw-Hill, New Delhi
7	P. N Chopra, Micro Economics, Kalyani Publishers, New Delhi, 2015
8	K.K Dewett-Modern Economic Theory –Published by S,Chand & Company Ltd. Delhi

MANGALORE UNIVERSITY

Program Name	**BA in Economics**	**Semester**	**Second Semester**
Course Title	**Foundations of Macroeconomics**	No. of Credits	**5**
Course Code:	**SEP ECO 02**	Hrs per Week	**6**
Contact hours	**72 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1.Understand the Theories of National Income Accounting

CO2. Explain the process of Consumption and Investment Functions

CO3. Evaluate the Concept of Multiplier and Inflation

CO4. Evaluate the causes and remedies to Business Cycle

CO5. Understand Monetary Policy & Fiscal Policy.

CO6. Analyse Demand forecasting & Capital Budgeting

CO7. Understand practical Application of Economic Functions.

Contents	72 Hrs
Module- I: MACROECONOMICS AND NATIONAL INCOME ACCOUNTING Macroeconomics- Meaning- Scope, National Income- Meaning, Concepts – Real Income and Nominal Income – GDP, NDP, GNP, NNP, NI_{FC}, PI, DPI, PCI, Green GDP- Methods of Calculating National Income- Difficulties in the Calculation of National Income.	**10**
Module- II: THEORIES OF INCOME AND EMPLOYMENT Classical theory of employment- Say's Law of Market- Limitations- Pigou's Wage cut policy- Keynesian Theory of Employment – Determination of Effective Demand– limitations Consumption Function- meaning – MPC & APC- Determinants –Psychological Law of Consumption. Investment Function- MEC & Rate of Interest- Determinants of MEC- Concepts of Multiplier and Accelerator.	**14**

: MACROECONOMIC ISSUES ic Fluctuations- Business cycle- Meaning Phases-Causes and Remedies. Poverty, s- Unemployment- Types. Inflation- Meaning, Types, Causes and Measures. Inflationary Gap. Phillips Curve.	**12**
Module - IV: MACROECONOMIC POLICIES Fiscal policy – Meaning – Objectives and Instruments – Monetary Policy – Meaning – Objectives and Instruments. Budget- types– components– Deficit financing- Objectives, Safe Limits and Effects.	**12**
Module - V: MACROECONOMIC TECHNIQUES Index Number Analysis. Meaning, types, uses and limitations of Index Numbers. Demand Forecasting- Meaning, importance, techniques and Methods- Capital Budgeting, Meaning, importance, techniques and Methods	**10**
Module - VI: APPLICATION OF ECONOMIC FUNCTIONS. Methods of Measurement of Index Number- Laspyre's, Paasche's, Marshall-Edgeworth's and Fisher's Ideal Index Numbers. Meaning of Time Series - Components of time series, Measurement of Trends -Semi average, Moving Averages and Principle of Least Squares.	**14**

Pedagogy: Classroom lecture, tutorials, Problem solving exercise

Formative Assessment for C1 & C2		
Assessment	**Marks**	
	C1	**C2**
Internal Test	10	10
OR		
Internal Test	10	
Assignment & Seminar		5+5=10
Total	**20 Marks**	
Formative Assessment as per SEP guidelines are compulsory		

	ices
	Ackley, G. (1976), Macroeconomics: Theory and Policy, Macmillan Publishing Company, New York.
2	Ahuja H L (2016), Macro Economics- theory and policy, S Chand and Co
3	Dwivedi DN (2016) Macro Economics: Theory and Policy, Tata McGraw-Hill
4	Heijdra, B.J. and F.V. Ploeg (2001), Foundations of Modern macroeconomics, Oxford University Press, Oxford.
5	Keynes, J.M. (1936), The General theory of Employment, Interest and Money, Machmillan, London.
6	Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Massachusetts
7	Mithani D. M. (2010) - Macro Economics- Himalaya Publishing House, Mumbai.
8	Puri V.K. and Misra S.K. (2004) - Modern Macroeconomic Theory - Himalaya Publishing House, Mumbai.
9	Sundaram K P M & Sundaram E. N (2002) Macro Economic theory – S Chand & Company Ltd., New Delhi.
10	Vaish M .C (2014) - Macro Economic Theory - Vikas publishing House Pvt Ltd., Noida.

Question Paper Pattern for UG Semester I Sem & II Sem

Paper Code: Paper Title:

Duration of Exam 3 Hours Max Marks 80 Marks

Instruction: Answer all the sections

Section-A

1. Answer ALL the following sub-questions, each sub-question carries ONE mark (10X1=10)

A.
B.
C.
D.
E.
F.
G.
H.
I.
J.

Section-B

Answer any SIX of the following questions, each question carries FIVE marks (5X6=30)

2.
3.
4.
5.
6.
7.
8.
9.

Section-C

Answer any FOUR of the following questions, each question carries TEN marks (4X10=40)

10.
11.
12.
13.
14.
15.

MANGALORE UNIVERSITY

Mathematics Syllabus for Three Major B. Sc. Programme from the Academic year 2024-25

(Semester Scheme)

Preamble:

The B.Sc. Mathematics course aims to provide students with a comprehensive foundation in mathematical principles, theories, and applications. This program is designed to develop critical thinking, analytical skills, and problem-solving abilities essential for various scientific and technical careers.

The Mathematics syllabus for B.Sc. (Two Major Programme) in use at present was introduced from the academic year 2021-22 as per NEP-2020 structure and guidelines given by the state government in 2021. Based on the directions and guidelines from the Higher Education Council of the Government of Karnataka (GO: ED 166 UNE 2023 Bangalore, Date: 08.05.2024), Mangalore University has issued new guidelines to launch the Three Major B.Sc. degree programme starting from the academic year 2024-25. Consequently, the revised and restructured syllabus for Mathematics as an optional subject in the B.Sc. (Three Major Programme) has been prepared according to the new regulations of the University, by modifying the earlier syllabus, including Lab components and introducing new text and reference books.

The following new syllabus for Mathematics as an optional subject in the B.Sc. (Three Major Programme) at Mangalore University has been framed by the Board of Studies in Mathematics for the UG programme. This syllabus will be implemented starting from the academic year 2024-25.

Aims and objectives of the restructured syllabus

- Equip students with a deep understanding of core mathematical concepts and methodologies.
- Improve the perspective of students on mathematics as per modern requirement and develop a spirit of inquiry and scientific temper in the student.
- Initiate students to enjoy mathematics, pose and solve meaningful problems, to use abstraction to perceive relationships and structure and to understand the basic structure of mathematics.
- Create a student-friendly learning environment by encouraging experimental, problem-solving, and discovery-based approaches to learning mathematics.
- To orient students towards relating mathematics applications and improve retention of mathematical concepts in the student.

- To enable the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters with the help of FOSS tools on a computer.
- Encourage analytical and research-oriented thinking to prepare students for advanced studies and professional careers.
- Provide scope for greater involvement of both the mind and the hand and help the student build interest and confidence in learning the subject.
- Facilitate an interdisciplinary approach by integrating mathematics with other scientific and technical fields.
- Introduce new and relevant textbooks and reference materials to ensure students have access to current knowledge and resources.

Program outcomes:

On successful completion of the program, the student will be able to -

1. Verbally communicate mathematical ideas, write logically sound proof, accurately work with formulae and numerical information.
2. Apply solving techniques of differential equations in Mathematics, Physics, Chemistry and Biology.
3. Understand the actual theories behind solving techniques of problems in Calculus, Algebra and Analysis.
4. Connect theoretical and practical aspects of Mathematics.
5. Solve problems in the post graduate entrance exams with ease.
6. Acquire mathematical skill set to clear various aptitude tests conducted by multi-national companies.

Program specific outcomes:

1. The syllabus imparts various technical skills solving mathematical problems and apply them to other fields.
2. Student will be acquiring knowledge to compete at national and international level.
3. Employability will be improved with the knowledge of Mathematical software's.
4. Domain knowledge will be upgraded with the knowledge of applications.
5. Student will be able to handle the challenges due to upgradation of softwares.

This syllabus has been carefully curated by the Board of Studies in Mathematics, incorporating feedback from academic experts, industry professionals, educational policymakers, and all the stakeholders. It is designed to meet the evolving demands of education and industry, ensuring that graduates are well-prepared to contribute effectively in their chosen fields. The implementation of this syllabus will commence from the academic year 2024-25, marking a significant step towards academic excellence and innovation in the field of mathematics.

COURSE PATTERN AND SCHEME OF EXAMINATION
MAJOR SUBJECT: MATHEMATICS

Particulars	Theory(T)/ Practical(P)	Instruction Hours/ Week	Duration of Exam	Marks			Number of Credits
				IA	Semester End Exam	Total	
Semester - I							
Course-1 : Calculus	T	4	3	20	80	100	3
Course-2: Practical-I	P	4	3	10	40	50	2
Semester - II							
Course-3 : Advanced Calculus and Differential Equations	T	4	3	20	80	100	3
Course-4: Practical-II	P	4	3	10	40	50	2
Semester - III							
Course-5 : Number Theory and Higher Order Differential Equations	T	4	3	20	80	100	3
Course-6 : Practical-III	P	4	3	10	40	50	2
Course-7: Elective-1 (a) Mathematical Logic and Set Theory OR (b) Quantitative Mathematics	T	2	2	10	40	50	2
Semester - IV							
Course-8 : Group Theory, Sequences and Series	T	4	3	20	80	100	3
Course-9 : Practical-IV	P	4	3	10	40	50	2
Course-10 :Elective-2 (a) Basic Combinatorial Theory OR (b) Vedic Mathematics	T	2	2	10	40	50	2
Semester - V							
Course-11 : Ring Theory and Laplace Transforms	T	3	3	20	80	100	3
Course-12 : (a) Vector Calculus OR (b) Graph Theory (c) Total Differential Equations and PDE	T	3	3	20	80	100	3
Course-13 :Numerical Methods with Lab	P	4	3	10	40	50	2
Semester - VI							
Course-14 : Complex Analysis and Linear Algebra	T	3	3	20	80	100	3
Course-15 : (a) Numerical Analysis OR (b) Operations Research	T	3	3	20	80	100	3
Course-16 : Practicals on Complex Analysis and Linear Algebra	P	4	3	10	40	50	2

Note:

1. In the 3rd and 4th semesters, Course-7(a), Course-7(b), Course-12(a) and Course-12(b) are Elective Courses. Any B.Sc. student with Mathematics as one of their major subjects may choose either Course-7(a) or Course-7(b) in the third semester, and one of Course-10(a) or Course-10(b) in the fourth semester.

2. For 5th and 6th semesters, Course-11 and Course-14 respectively are compulsory Courses. In the 5th semester, a student has to choose one of the special Courses either Course-12(a) or

Course-12 (b). In the 6th semester, a student has to choose one of the special Courses from Course-15(a) or Course-15(b).

Syllabus

I Semester

Course 1	Calculus	3 Credits	(56 Hours, 4 hours/week)

Course Objectives:

- To review and strengthen understanding of the fundamental concepts of differentiable functions, including properties of differentiation, and critical points.
- To provide a thorough understanding of key theorems in calculus such as Rolle's Theorem, Mean Value Theorem, and Cauchy's Mean Value Theorem.
- To apply calculus concepts to practical problems, including curve sketching, optimization problems, and evaluating integrals using various techniques.
- To develop proficiency in different integration techniques and their applications, including the use of reduction formulae.
- To introduce and explore the concepts of functions of several variables, including limits, continuity, partial derivatives, and their applications.

Course Outcomes:

- Students will be able to understand and apply properties of differentiation, and solve problems involving local extrema and concavity.
- Students will be able to understand and apply key theorems such as Rolle's Theorem, Mean Value Theorem, and Cauchy's Mean Value Theorem in various contexts.
- Students will develop the ability to solve applied optimization problems, sketch curves, and use asymptotes effectively in analysis.
- Students will be able to evaluate definite and indefinite integrals using techniques such as reduction formulae, partial fractions, etc.
- Students will gain a solid understanding of the behavior of functions of several variables, and get ability to compute and interpret directional derivatives and gradients.
- Students will be able to find and classify extreme values and saddle points for functions of two variables, using second derivative tests and other techniques.

Unit I: **(14 Hours)**

Recapitulation: Definition and Examples of Differentiable functions, Properties of Differentiation, Increasing decreasing functions, critical points, local extrema.
Rolle's Theorem, The mean value theorem. Concavity, Points of inflection, Second derivative test for concavity, Second derivatives test for local extrema, Asymptotes (horizontal, vertical and oblique), Sketching curves $y = f(x)$, Applied Optimization Problems.

Unit II **(14 Hours)**

Indeterminate Forms (all types), L'Hospital's Rules (First form and stronger form), Cauchy's Mean Value Theorem, Taylor's and Maclaurin's series.

Vector Calculus: Directional Derivatives, Gradient of Functions of Two or Three Variables, Properties of Directional Derivatives, Gradients and Tangents to Level Curves, Level Surfaces, Tangent Planes and Normal Lines to Level Surfaces.

Unit III **(14 Hours)**

Integration: Techniques of integration, definite integrals, Mean value theorem for definite integrals, Fundamental theorem of calculus (Part 1 and 2). Derivation of reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \log^n x\,dx$, $\int \sec^n x\,dx$, $\int \sin^n x\,\cos^m x\,dx$, etc. Evaluation of integrals using reduction formulae, Integration of rational functions by partial fractions, trigonometric integrals.

Unit IV **(14 Hours)**

Functions of several variables: Domain, Range, Interior points, Boundary points, Closed, Open, Bounded and unbounded regions in the plane, Level curves and Level surfaces. Limits and Continuity, Two-Path tests for non-existence of limits, Partial derivatives, Implicit partial differentiation, Partial derivatives and continuity, Higher order partial derivatives, Mixed derivative theorem, Differentiability, Chain rule for differentiation. Extreme value and saddle points for the functions of two variables , second derivative test for local extrema.

Text Book

Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008.

References

[1] Lipman Bers *Calculus*, Holt,Rinehart & Winston of Canada Ltd., 1969.

[2] Louis Leithold, *Calculus with Analytic Geometry*, 5th Ed., Harper and Row International, 1986.

[3] George B. Thomas and Ross L. Finney, *Calculus and Analytic Geometry*, Addison-Wesley, 1992.

[4] Joseph Edwards, *Integral Calculus for Beginners*, Arihant Publishers, 2016 (original 1896).

[5] Shanti Narayan and P K Mittal, *Differential Calculus*, S Chand and Company Ltd. New Delhi 2014.

[6] Shanti Narayan and P K Mittal, *Integral Calculus* S Chand and Company Ltd. New Delhi 2005.

Course 2	Practical -I	2 Credits	(56 Hours, 4 hours/week)

Practicals for I Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) Finding the limit of a function and checking the continuity of a function at a point.
2) Checking the differentiability of conditional functions.
3) Plotting of standard Cartesian curves using Maxima.
4) Finding the solutions of optimization problems.
5) Verification of Rolle's theorem and Lagrange's theorem.
6) Verification of Cauchy's mean value theorem.
7) Generating Taylor's series and Maclaurin's series.
8) Finding the equation of the tangent plane to the surface $z = f(x, y)$ and plot them.
9) Finding the average value and verification of fundamental theorem.
10) Finding the area enclosed between two curves.
11) Find the definite integrals using the reduction formula manually and then verification using maxima command.
12) Finding the partial derivatives and verification of Laplace equation.
13) Euler's theorem and Illustration examples for its verification.
14) Finding the extreme values of functions of two variables.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

II Semester

Course 3	Advanced Calculus and Differential Equations	3 Credits	(56 Hrs, 4 hrs/week)

Course Objectives:

- To develop a comprehensive understanding of polar coordinates, their applications in graphing, and the analysis of conic sections.
- To gain proficiency in evaluating line integrals and multiple integrals, and understanding their applications in various coordinate systems.
- To provide a solid foundation in differential equations, including methods for solving first-order differential equations.
- To explore practical applications of differential equations in various fields, enhancing problem-solving skills.

- To understand more complex differential equations, including nonlinear equations and orthogonal trajectories, and their solutions.

Course Outcomes:

- Students will be able to convert between polar and Cartesian coordinates, graph equations in polar coordinates, and calculate areas and lengths.
- Students will classify and analyze conic sections by eccentricity, and work with their polar equations to sketch and identify various conics.
- Students will evaluate line integrals over plane and space curves, understanding their applications and computations.
- Students will master double and triple integrals, including changing between Cartesian and polar coordinates, and apply these techniques to calculate volumes, areas, and averages.
- Students will understand and solve first-order differential equations using various methods, including separation of variables and integrating factors.
- Students will apply differential equations to model and solve real-world problems in physics, chemistry, and other fields.

Unit I: **(14 Hours)**

Polar Co-ordinates: Definition, Polar equations and graphs, Relating Polar and Cartesian Co-ordinates, Graphing in Polar Co-ordinates, Areas and Lengths in Polar Co-ordinates, Area of a surface of revolution.

Conic Sections: Classifying conic sections by eccentricity, Conic Sections in Polar Co-ordinates, Polar equation for lines, ellipse, parabola and hyperbola with eccentricity. Identification by finding eccentricity, and drawing the sketch .

Unit II: **(14 Hours)**

Line Integrals: Definition and Examples, Evaluating line integrals over plane curves and over space curves.

Multiple Integrals : Double Integrals over rectangles, Double integrals as volumes, Fubinis theorem for calculating double Integrals, Finding regions of Integration, Double integrals over bounded Nonrectangular regions, Volume of solids, Evaluating the double integrals, Finding regions, Reversing the order, Areas of bounded regions in the plane, Average, Volume of an integrable function, Evaluating double integrals in Polar co-ordinates, Finding limits of function, Area in Polar co-ordinates. Changing Cartesian Integral to Polar Co-ordinates, Triple integrals in Rectangular co-ordinates, Evaluating triple integrals.

Unit III: **(14 Hours)**

Recapitulation: Definitions, Families of Curves, Examples of Differential Equations, Definitions, Families of solutions, Equations of Order One, Separation of Variables.

Equations with Homogeneous Coefficient, Exact Equations, The Linear Equation of Order One, The General Solution of a Linear Equation, Integrating factors found by inspection, The Determination of Integrating Factors, Substitution Suggested by the Equation, Bernoulli's Equations.

Unit IV: **(14 Hours)**

Applications of Differential Equations : Elementary Applications Velocity of Escape from the Earth, Newton's law of Cooling, Simple Chemical Conversion Logistic Growth and the Price of Commodities.

Orthogonal Trajectories : Cartesian and Polar co-ordinates.

Nonlinear Equations, Factoring the Left Member, Singular Solutions, Eliminating the Dependent Variable, Clairaut's Equation, Dependent Variable Missing, Independent Variable Missing.

Text Book

1. Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008 (for Unit-I and Unit-II).
2. Earl D Rainville and Philip E Bedient, *Elementary Differential Equations*, Pearson, 8th Ed., 2016. (For Unit III and Unit-IV.)
3. Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991. (For Unit-IV.)

References

[1] Maurice D. Weir, George B. Thomas, Jr., Joel Hass, Frank R. Giordano, *Thomas' Calculus*, 11th Ed., Pearson, 2008.

[2] Louis Leithold, *Calculus with Analytic Geometry*, 5th Ed., Harper and Row International, 1986.

[3] Lipman Bers *Calculus*, Holt,Rinehart & Winston of Canada Ltd., 1969.

[4] Earl D Rainville and Philip E Bedient, *A Short Course in Differential Equations*, Macmillan Ltd., 4th Ed., 1969.

[5] Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991.

[6] Joseph Edwards, *Integral Calculus for Beginners*, Arihant Publishers, 2016 (original 1896).

[7] 1. M. D. Raisinghania, Ordinary Differential Equations & Partial Differential Equations, , S. Chand & Company, New Delhi, 20th Edition - 2020.

Course 4	Practical-II	2 Credits	(56 Hours, 4 hours/week)

Practicals for II Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) General and Particular Solutions of ordinary differential equations of first order.
2) Solving the differential equations of manually.
3) Verification of the exactness of a differential equation.
4) Differential equations which are solvable for p.
5) Solving Differential equations of Clairaut's form.
6) Plotting the orthogonal trajectories.
7) Area and length of the polar curves.
8) Tracing the polar curves.
9) Identifying the conic and tracing the conic.
10) Evaluation of line integrals.
11) Evaluation of double integrals with constant and variable limits.
12) Evaluation of triple integrals with constant and variable limits.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

III Semester

Course 5	Number Theory and Higher Order Differential Equations	3 Credits	(56 Hours, 4 hours/week)

Course Objectives:

- To develop a solid understanding of basic concepts in number theory, including the division algorithm, gcd, and the fundamental theorem of arithmetic.
- To explore more complex topics in number theory such as congruences, Fermat's and Wilson's Theorems, Euler's Phi-Function, and continued fractions.
- To provide knowledge and techniques for solving linear differential equations with constant coefficients, both homogeneous and non-homogeneous.
- To introduce and apply advanced methods for solving differential equations, such as reduction of order and variation of parameters.
- To apply differential equation solving techniques to real-world problems in physics and engineering, such as vibrations and electrical networks.

Course Outcomes:

- Students will be able to apply the division algorithm, calculate gcd using the Euclidean algorithm, solve Diophantine equations, and understand the fundamental theorem of arithmetic.
- Students will understand and use the basic properties of congruences, solve linear congruences, and apply the Chinese Remainder Theorem.
- Students will be able to state and apply Fermat's Theorem, Wilson's Theorem, and Euler's Theorem, and compute Euler's Phi-Function.
- Students will solve linear differential equations with constant coefficients, including finding the complementary function and particular integral for various forms of the non-homogeneous term.
- Students will use methods such as reduction of order and variation of parameters to solve more complex differential equations.
- Students will apply differential equation techniques to model and solve practical problems, including mechanical vibrations, electrical networks, and other systems.

Unit I: **(14 Hours)**

Number Theory: Division Algorithm, The Greatest Common Divisor (g.c.d), Euclidean Algorithm, Diophantine Equations, Fundamental Theorem of Arithmetic.

The Theory of Congruences, Basic Properties of Congruences, Binary and Decimal Representation of Integers.

Unit II: **(14 Hours)**

Number Theory: Linear Congruences and The Chinese Remainder Theorem, Fermat's Theorem, Wilson's Theorem, Euler's Phi-Function, Euler's Theorem, Some Properties of Phi-Function, Simple continued fractions.

Unit III: **(14 Hours)**

Linear Equations with Constant Coefficients: Introduction, The operator D, The Auxiliary Equation, solution of homogeneous equations with constant coefficients (Distinct roots, Repeated Roots, The Imaginary Roots).

Non-homogeneous Equations: Complementary function of a linear equation with constant coefficients, Particular integral, General method of finding particular integral, Special methods for finding particular integral when RHS of the non-homogeneous differential equation is of the form: e^{ax}, $\cos ax$, $\sin ax$, x^m $e^{ax}V(x)$, where $V(x)$ is $\sin ax$, $\cos ax$ or x^m. Solution of a Non-homogeneous equations by the method of Undetermined Coefficients.

Unit IV: **(14 Hours)**

Method of Reduction of Order, Variation of Parameters, Solution of $y'' + y = f(x)$ reducing to normal form, change of independent variable method.

Applications Vibration of a Spring, Undamped Vibrations Applications to Electrical Networks The Simple Pendulum. Solution of simultaneous equations.

Text Book

1. David M. Burton., *Elementary Number Theory*, 7th Ed., McGraw Hill, 2011. (For Unit-I and Unit-II.)

2. Earl D Rainville and Philip E Bedient, *Elementary Differential Equations*, Pearson, 8th Ed., 2016. (For Unit III and Unit-IV.)

3. Narayanan and Manicavachagom Pillay, *Differential Equations*, Viswanathan (Printers and Publisher) PVT Ltd., 1991. (For Unit III and Unit-IV.)

References

[1] Gareth A. Jones and J. Marry Jones, *Elementary Number Theory*, Springer, 1998.

[2] Earl D Rainville and Philip E Bedient, *A Short Course in Differential Equations*, Macmillan Ltd., 4th Ed., 1969.

[3] William E. Boyce, Richard C. DiPrima, *Elementary Differential Equations*, 10th Ed., Wiley Publishers, 2012.

Course 6	Practical-III	2 Credits	(56 Hours, 4 hours/week)

Practicals for III Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) On Euclidian algorithm., to find the GCD , LCM and verification of GCD LCM theorem.

2) Divisibility test (a number divisible by 9 and 11).

3) To find the solutions of Diophantine equations.

4) Solving the simultaneous equations using Chinese remainder theorem.

5) Verification of Fermat's theorem, Wilson's theorem and Euler's theorem.

6) To compute Euler's phi function for positive integers and to find the sum of all positive divisors of n.

7) Expressing a rational function as a finite continued fraction.

8) To find a rational number corresponding to a given continued fraction.

9) Solving higher order differential equations with variable coefficients manually.

10) Finding the complimentary function and particular integral of a linear differential equations.

11) Solutions of second ordered differential equations by finding the complimentary function.

12) Program to illustrate damped and undamped vibrations.

13) Solving simultaneous differential equations.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

Course 7 (a)	**Mathematical Logic and Set Theory**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- To develop a thorough understanding of propositional and predicate logic, including applications and equivalences.
- To introduce various methods and strategies for constructing mathematical proofs, emphasizing rules of inference and proof structures.
- To provide a comprehensive understanding of sets, relations, and functions, including operations, properties, and applications.
- To explore advanced topics such as equivalence relations, partial orders, and different types of functions, including one-to-one and onto functions.

Course Outcomes:

- Students will be able to construct and evaluate propositional logic statements, understand and apply logical equivalences, and solve problems using propositional logic.
- Students will be able to construct valid mathematical proofs using various methods, including direct proof, indirect proof, and proof by contradiction, applying appropriate rules of inference.
- Students will understand and work with Cartesian products, equivalence relations, and partial orders, and apply these concepts to classify and analyze relationships between elements.
- Students will be able to define and work with various types of functions, including one-to-one, onto, inverse functions, and compositions of functions, understanding their properties and applications.

Unit I: **(14 Hours)**

Mathematical Logic: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inferences, Introduction to Proofs, Proof Methods and Strategy.

Unit II: **(14 Hours)**

Relations and Functions: Sets and subsets, Set Operations and the Laws of Set Theory, Cartesian Products and Relations, Equivalence relation and partition, Partial Order. Functions: Definition and Examples, One-to-One and Onto functions, Inverse Functions and Compositions of Functions.

Text Book Ralph P. Grimaldi, Discrete Combinatorial Mathematics, 5th Ed., Pearson, 2006.

References

[1] David J. Hunter *Essentials of Discrete Mathematics*, 4th Ed.,Jones & Bartlett Learning Company, 2021.

[2] Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Ed., McGraw Hill, 2012.

[3] D. I. A. Cohen, Basic Techniques of Combinatorial Theory, John Wiley and Sons, New York, 1978.

[4] Fred S. Roberts, Barry Tesman, Applied Combinatorics, 2nd Ed., CRC Press, 2009.

[5] JG. E. Martin, Counting: The Art of Enumerative Combinatorics, UTM, Springer, 2001.

Course 7(b)	**Quantitative Mathematics**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- Gain foundational knowledge of number systems, divisibility tests, HCF, LCM, decimal fractions, and simplification techniques.
- Enhance skills in solving problems related to averages, numbers, and ages through practical applications.
- Learn to calculate percentages, profit and loss, ratios, proportions, and understand the concepts of partnership.
- Tackle calendar and clock problems, and apply mathematical principles to solve problems involving heights and distances.

Course Outcomes:

Upon successful completion of this course,

- Students will be able to apply knowledge of number systems, divisibility, HCF, LCM, and decimal fractions to solve mathematical problems.
- Students gets ability to Solve arithmetic problems, handle simplification tasks, compute averages, and solve number and age-related problems effectively.
- Students will be able to calculate percentages, understand profit and loss, and solve problems involving ratios, proportions, and partnerships.
- Students will be able to address practical scenarios, solve calendar and clock problems, and apply mathematical concepts to determine heights and distances.

Unit I: **(14 Hours)**

Number System, Divisibility Tests, HCF and LCM of numbers. Decimal Fractions, Simplification, Average, Problems on numbers, Problems on ages.

Unit II: **(14 Hours)**

Percentage,Profit and Loss, Ratio and Proportion, Partnership, Calender Problems, Clock Problems, Heights and Distances.

Text Book R.S. Agarwal, Quantitative Aptitude, S. Chand and Company Limited, New Delhi -2021.

References

[1] Abhijit Guha, Quantitative Aptitude, Mc.Grawhill publications, 5thEdition - 2014.

[2] R. V. Praveen, Quantitative Aptitude and Reasoning, PHI publishers, 3rd Edition – 2016.

[3] R. S. Aggarwal, Objective Arithmetic, S. Chand & Company Ltd, Revised Edition – 2018.

[4] Qazi Zameeruddin,Vijay K. Khanna, S. K. Bhambri, Business Mathematics, S. Chand publications, 2ndEdition - 2009.

[5] S. K. Sharma and Gurmeet Kaur, Business Mathematics, Sultan Chand & Sons – 2019.

[6] Hazarika Padmalochan, A Text Book of Business mathematics for B.Com and BBA Course, S. Chand Publication-2017.

[7] N. G. Dasand, J. K. Das, Business Mathematics and Statistics, Mc.Grawhill Education-2017.

IV Semester

Course 8	**Group Theory, Sequences and Series**	**3 Credits**	**(56 Hrs, 4 hrs/week)**

Course Objectives:

The course will help the students

- To introduce the fundamental concepts of group theory, including binary operations, group structures, and subgroups.
- To explore deeper aspects of group theory such as cosets, normal subgroups, homomorphisms, and isomorphism theorems.
- To provide a comprehensive understanding of sequences, their properties, and the theorems related to sequence limits and convergence.
- To develop skills in analyzing series, including tests for convergence, and understanding the behavior of series with positive terms and alternating series.

Course Outcomes:

- Students will understand and apply concepts of binary operations, group structures, and subgroups, including cyclic subgroups and permutation groups.
- Students will be able to work with cosets, direct products, finitely generated abelian groups, and understand and apply theorems related to homomorphisms and factor groups.
- Students will be able to analyze sequences of real numbers, determine their convergence, and apply theorems such as Bolzano-Weierstrass and Cauchy's convergence criteria.

- Students will understand and apply various tests for series convergence, analyze geometric and harmonic series, and distinguish between absolute and conditional convergence.
- Students will be able to apply the theoretical concepts of group theory and sequence analysis to solve complex problems in mathematics.

Unit I: **(14 Hours)**

Group Theory: Binary Operations, Isomorphic Binary Structures, Groups, Examples (Abelian and non-abelian), Finite Groups and Group Tables, Subgroups, Cyclic subgroups, Cyclic Groups, Structure of Cyclic Groups, Subgroups of Finite Cyclic Groups, Groups of Permutations - Orbits, Cycles and Alternating Groups.

Unit II: **(14 Hours)**

Group Theory (contd.): Cosets and the Theorem of Lagrange, Direct Products and Finitely Generated Abelian Groups. Homomorphisms, Kernel of a Homomorphism, Normal Subgroups, Factor Groups, Isomorphism Theorems (First, Second and Third).

Unit III: **(14 Hours)**

Sequences: Recapitulation of number system - Real line, bounded sets, suprimum and infimum of a set, Archimedean property of $\mathbb{R}$. Intervals, Neighborhood of a point, open sets, closed sets, limit points. Sequences of real numbers, Bounded sequences. Limit of a sequence, convergent, divergent, and oscillatory sequences. Monotonic sequences, Algebra of convergent sequences. Limit points of a sequence, Bolzano Weierstrass theorem for sequence. Cauchy's first and second theorem on limits of a sequence. Cauchy's general principle for convergence of a sequence. Subsequence and their properties.

Unit IV: **(14 Hours)**

Definition of convergent, divergent and oscillatory series. Series of non-negative terms, Cauchy's general principle of convergence. Geometric series, P-series (Harmonic series). Comparison tests for positive term series. D'Alembert's ratio test, Raabe's test. Cauchy's Root test and Cauchy's integral test. Alternating series. Leibnitz's theorem. Absolute convergence and conditional convergence of a series.

Text Book:

1. J. B. Fraleigh and N. Brand, A First Course in Abstract Algebra, 8th Edition, Pearson, 2014. (For Unit I and Unit-II)
2. S.C. Mallik ansd Savita Arora, *Mathematical Analysis*, New Age International Publishers, 6th edition 2022. (For Unit III and Unit-IV)

References

[1] N. S Gopalakrishnan, *University Algebra*, 3rd Ed., New Age International Publications, 2015.

[2] G. D. Birkoff and S Maclane, *A brief Survey of Modern Algebra*, 2nd Ed., IBH Publishing Company, Bombay, 1967.

[3] Joseph Gallian, *Contemporary Abstract Algebra*, Narosa, 1999.

[4] I. N. Herstein, *Topics In Algebra*, 2nd Ed., Wiley Publishers, 1975.

[5] S.C Mallik, *Principles of Real Analysis*, New Age International Publications, 2008.

Course 9	Practical-IV	2 Credits	(56 Hrs, 4 hrs/week)

Practicals for IV Semester

Mathematics practicals with Free and Open Source Software (FOSS) tools for computer programs

Course Objectives:

- To learn programming skills in Scilab/Maxima through listed programs.
- To apply the programming skills in Science and Engineering problems.

Course Outcomes:

Students will have the knowledge and skills to implement the programs listed below in the Scilab/Maxima programming language. They can be expected to apply these programming skills of computation in science and Engineering.

Programs:

1) Verification of binary operation.
2) Finding the identity and inverse element in a group.
3) Finding all possible subgroups of a group.
4) Construction of the Cayley's table.
5) Finding the generators of a cyclic group.
6) Finding the left and right cosets and index of a group.
7) Verification of the Lagrange's theorem.
8) Testing the convergence of the sequence.
9) Convergence of positive term series using Cauchy's criterion
10) Convergence of geometric series, p–series, convergence using limit form.
11) Convergence of positive term series using D'lembert's test , n^{th} root test, Cauchy's integral test, Raabe's test.
12) Convergence of alternating series using Leibnitz's test.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

Course 10(a)	Basic Combinatorial Theory	2 Credits	(28 Hrs, 2 hrs/week)

Course Objectives:

The course will help the students

- To introduce students to the basic principles of counting, including permutations, combinations, and binomial coefficients, and their applications.
- To explore advanced counting methods such as the Pigeon-hole Principle, Principle of Inclusion-Exclusion, and derangements, and their applications in solving combinatorial problems.
- To develop proficiency in generating functions as a tool for solving combinatorial problems, including partition of integers and applications of exponential generating functions.
- To understand and solve first and second-order linear homogeneous and non-homogeneous recurrence relations using methods such as generating functions.

Course Outcomes:

- Students will be able to apply counting principles to solve problems involving permutations, combinations, and binomial coefficients.
- Students will apply the Pigeon-hole Principle, Principle of Inclusion-Exclusion, and derangements to solve complex combinatorial problems.
- Students will be proficient in using generating functions to solve problems related to partitioning integers and other combinatorial applications.
- Students will understand and solve first and second-order linear homogeneous and non-homogeneous recurrence relations, applying techniques such as generating functions to find solutions.
- Students will develop strong problem-solving skills in combinatorial mathematics, applying counting principles, generating functions, and recurrence relations to solve a variety of problems.

Unit I: **(14 Hours)**

Counting: The Basics of Counting, Pigeon-hole Principle, Permutations and Combinations, Binomial Coefficients and identities, Generalized Permutations and Combinations.

Advanced Counting Techniques: Principle of Inclusion-Exclusion, Generalizations of the Principle, Derangements.

Unit II: **(14 Hours)**

Generating Functions: Introductory Example, Calculation Techniques, Partition of integers, Exponential Generating Function, The Summation operator.

Recurrence Relations: The First Order Linear Recurrence Relations, Second Order Linear Homogeneous Recurrence Relations with Constant Coefficients, Non- homogeneous Recurrence Relations, The method of Generating Functions.

Text Book Ralph P. Grimaldi, Discrete Combinatorial Mathematics, 5th Ed., Pearson, 2006.

References

[1] David J. Hunter *Essentials of Discrete Mathematics*, 4th Ed.,Jones & Bartlett Learning Company, 2021.

[2] Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th Ed., McGraw Hill, 2012.

[3] D. I. A. Cohen, Basic Techniques of Combinatorial Theory, John Wiley and Sons, New York, 1978.

[4] Fred S. Roberts, Barry Tesman, Applied Combinatorics, 2nd Ed., CRC Press, 2009.

[5] JG. E. Martin, Counting: The Art of Enumerative Combinatorics, UTM, Springer, 2001.

Course 10(b)	**Vedic Mathematics**	**2 Credits**	**(28 Hrs, 2 hrs/week)**

Course Objectives:

- Learn the 16 Suthras, 13 Subsuthras, terms, operations, and concepts of base and deficiency in Vedic mathematics.
- Apply Vedic methods for addition, subtraction, multiplication, and division, including special techniques and practical applications.
- Study osculators, divisibility tests, bar numbers, and the vertically and crosswise method for simplifying and comparing fractions.
- Use Vedic techniques for squaring numbers, finding square roots, and calculating cubes and cube roots.

Course Outcomes:

Upon successful completion of this course,

- Students will be able to apply Vedic Suthras and Subsuthras to perform arithmetic operations efficiently and accurately.
- Students will get used to Vedic techniques for quick addition, subtraction, multiplication, and division, enhancing calculation speed and accuracy.
- Students gets ability to implement advanced methods like osculation, bar numbers, and the vertically and crosswise method for solving complex arithmetic problems.
- Students will be able to calculate squares, square roots, cubes, and cube roots using Vedic methods, improving problem-solving skills in various mathematical contexts.
- Students will be able to simplify and compare fractions effectively using Vedic arithmetic techniques, facilitating easier and faster computation.

Unit I: **(14 Hours)**

Introduction, 16 Suthras, 13 Subsuthras of Vedaganitha, Terms and Operations, Vinculum Numbers, The concept of Base and Deficiency

Addition: Digit Sums, Adding Digits, Nine Point Circle, Casting out Nines, Digit Sum Puzzles, Digit sum Chek.

Subtraction: All from 9 and Last from 10 rule for Subtraction, Application in Day today life.

Multiplication: Multiplication of two numbers using Base and Sub base method in different cases, Ekadhikenpurven method Urdhvatiragbhyam method two/, Nikhilam Navtashchramam

Dashtaha Combined Operations. Multiplication by Doubling and Halving.
Division: Special methods of Division, Number splitting, Division by 9 and 11, Division by two digit number using Nikhilam Navtashchramam Dashtaha Suthra.

Unit II: **(14 Hours)**

Osculators , Divisibility Test by Osculation Process
Bar Numbers, Removing Bar numbers, and Creating Bar Numbers.
Multiplying Binomials, Simplification and Comparison of fractions by Vertically and Crosswise method.
Square of numbers ending with 5, Square of numbers below 50,Nearer to base, near subbase, General Method for Squaring.
Square Roots, Reverse squaring to find Square Root of Numbers ending in 25, Square root of perfect squares, General method of Square Roots, Cube and Cube roots.

Text Books

1. Sri BharatiKrsnaTirthaji, "Vedic Mathematics", published by MotilalBanarsidass, 1965. ISBN 81-208-0163-6.
2. Fundamentals & Applications Ofvedic Mathematics by State Council of Educational Research & TrainingVarun Marg, Defence Colony, New Delhi-110024, Published by : State Council of Educational Research & Training, New Delhi and printed at Educational Stores, S-5, Bsr. Road Ind. Area, Ghaziabad (U.P.)
3. Vedic Mathematics Teachers Manual:Elementary Level by Kenneth R Williams, ISBN 978-1-902517-16-2 Published by Inspiration Books

References

[1] Williams K.R. "Discover Vedic Mathematics." Vedic Mathematics Research Group, 1984.

[2] Williams K.R. and M. Gaskell "The Cosmic Calculator". Motilal Banarsidass, 2002.

[3] Nicholas A.P., Williams, J. Pickles. "Vertically and Crosswise". Inspiration Books, 1984.

[4] Vedic Mathematics, Motilal Banarsidass Publishers, NewDelhi -1990.

[5] Vedic Ganita: Vihangama Drishti-1, SikshaSanskriti Uthana Nyasa, New-Delhi.

[6] Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New-Delhi.

Question Paper Patterns for Semester Exams

B.Sc. Mathematics (Three Major Scheme)

Theory (3 credit core courses)

For I /II / III/ IV Semesters

Duration: 3 hours Max. Marks: 80

PART -A	
I. Answer any 10 questions out of 14 questions ($10 \times 2 = 20$)	
Question Number	Unit 1 to 4
1 to 14	At least 3 questions from each unit
PART -B	
II. Answer 12 questions by choosing any three from each unit ($12 \times 5 = 60$)	
Question Number	Units
1 to 5	Unit - 1
6 to 10	Unit - 2
11 to 15	Unit - 3
16 to 20	Unit - 4

Theory (2 credit elective courses)

For III/ IV Semesters

Duration: 2 hours Max. Marks: 40

PART -A	
I. Answer any 5 questions out of 8 questions ($5 \times 2 = 10$)	
Question Number	Unit Number
1 to 4	Unit - 1
5 to 8	Unit - 2
PART -B	
II. Answer 6 questions by choosing any three from each unit ($6 \times 5 = 30$)	
Question Number	Units
1 to 5	Unit - 1
6 to 10	Unit - 2

For Semesters I to IV

Semester Practical Exam 40 marks +Lab Internal Assessment 10 marks =50 marks

Components	Marks
Record	5
Program (writing and execution)	30
Viva	5

Lab Internal assessment: Lab internal assessment marks should be based on two lab tests.

Syllabus for B.A./B.Sc. with Mathematics as Major Subject
&
B.A./B.Sc. (Hons) Mathematics

SEMESTER – III
(2022-23 onwards)

MATDSCT 3.1: Ordinary Differential Equations and Real Analysis – I	
Teaching Hours: 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 56 Hours	**Max. Marks: 100 (SEE- 60 + I.A. - 40)**

Course Learning Outcomes: This course will enable the students to:

- Solve first-order non-linear differential equations and linear differential equations.
- To model problems in nature using Ordinary Differential Equations.
- Formulate differential equations for various mathematical models
- Apply these techniques to solve and analyze various mathematical models.
- Understand the fundamental properties of the real numbers that lead to define sequence and series, the formal development of real analysis.
- Learn the concept of Convergence and Divergence of a sequence.
- Able to handle and understand limits and their use in sequences, series, differentiation, and integration.
- Apply the ratio, root, alternating series, and limit comparison tests for convergence and absolute convergence of an infinite series.

Ordinary Differential Equations:

Unit I: Recapitulation of Differential Equations of first order and first degree, Exact Differential equations, Necessary and sufficient condition for the equations to be exact, Reducible to the exact differential equations. Differential equations of the first order and higher degree: Equations solvable for p, x, y. Clairaut's equation and singular solution. Orthogonal trajectories of Cartesian and polar curves. **14hrs**

Unit II: Linear differential equations of the nth order with constant coefficients. Particular Integrals when the RHS is of the form e^{ax}, sin(ax+b), cos(ax+b), x^n, e^{ax} V and x V (with proofs), where V is a function of x. Cauchy – Euler equations, Legendre differential equations, Method of variation of parameters. Simultaneous differential equations with two and more than two variables. Condition for integrability of total differential equations P dx +Q dy+ R dz = 0.

14 hrs

Real Analysis – I :

Unit III: Sequences: Sequences of real numbers, Bounded sequences. Limit of a sequence. convergent, divergent, and oscillatory sequences. Monotonic sequences. Algebra of convergent sequences. Limit points of a sequence. Bolzano Weierstrass theorem for sequence. Limit superior and limit inferior of sequences. Cauchy's first and second theorem on limits of a sequence. Cauchy's general principle for convergence of a sequence. Subsequence and their properties.

14hrs

Unit IV: Infinite Series: Definition of convergent, divergent and oscillatory series. Series of non-negative terms, Cauchy's general principle of convergence. Geometric series, P-series (Harmonic series). Comparison tests for positive term series. D'Alembert's ratio test, Raabe's test. Cauchy's Root test and Cauchy's integral test. Alternating series. Leibnitz's theorem. Absolute convergence and conditional convergence of a series. Summation of series: Binomial, exponential and logarithmic. **14 hrs**

Reference Books:

1. M.D.Raisinghania, Ordinary Differential Equations & Partial Differential Equations, S. Chand & Company, New Delhi.
2. J. Sinha Roy and S Padhy: A course of Ordinary and Partial Differential Equation, Kalyani Publishers, New Delhi.
3. D. Murray, Introductory Course in Differential Equations, Orient Longman (India)
4. W. T. Reid, Ordinary Differential Equations, John Wiley, New Delhi.
5. M. L. Khanna, Differential Equations, Jai PrakashNath& Co. Meerut.
6. S. L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.
7. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2015.
8. Gerald G. Bilodeau, Paul R. Thie, G.E. Keough, An Introduction to Analysis, 2nd Ed., Jones & Bartlett, 2010.
9. K. A. Ross, Elementary Analysis: The Theory of Calculus (2^{nd} edition), Springer, 2013
10. S. K. Berberian, A First Course in Real Analysis, Springer Verlag, New York, 1994.
11. T. Apostol, Mathematical Analysis, Narosa Publishing House
12. M.L Khanna and L.S. Varhiney, Real Analysis by, Jai Prakash Nath & Co. Meerut.
13. Kreyzig, Advanced Engineering Mathematics, John Wiley, New Delhi.

PRACTICAL

MATDSCP 3.1: Practicals on Ordinary Differential Equations and Real Analysis – I	
Teaching Hours: 4 Hours/Week	**Credits: 2**
Total Teaching Hours: 56 Hours	**Max. Marks: 50** **(SEE - 25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to gain handson experience of

- Free and Open Source software (FOSS) tools or computer programming.
- Solving exact differential equations
- Ploting orthogonal trajectories
- Finding complementary function and particular integral of linear and homogeneous differential equations.
- Acquire knowledge of applications of real analysis and differential equations.
- Verification of convergence/divergence of different types of series

Practicals/Lab Work to be performed in Computer Lab

Use open-source software to executive the practical problems. (Maxima/ Scilab/MatLab /Mathematica/Python

1. Fundamentals of Ordinary differential equations and Real analysis using FOSS
2. Verification of exactness of a differential equation
3. Plot orthogonal trajectories for Cartesian and polar curves
4. Solutions of differential equations that are solvable for x, y, p.
5. To find the singular solution by using Clairaut's form.
6. Finding the Complementary Function and Particular Integral of linear and homogeneous differential equations with constant coefficients and plot the solutions.
7. Finding the Particular Integral of differential equations up to second order and plot the solutions.
8. Solutions to the Total and Simultaneous differential equations and plot the solutions.
9. Test the convergence of sequences
10. Verification of exponential, logarithm and binomial series.
11. Verification of geometric series, p-series, Cauchy's Integral test, root test, and D Alembert's Test
12. Examples on a series of positive terms.
13. Examples on alternating series using Leibnitz's theorem.
14. Finding the convergence of series using Cauchy's criterion for partial sums.

Open Elective Course

(For students of Science stream who have not chosen Mathematics as one of the Core Course)

MATOET3.1(A) Ordinary Differential Equations	
Teaching Hours: 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100** **(SEE - 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to:

- Understand the concept of the differential equation and their classification
- Know the meaning of the solution of a differential equation.
- To solve first-order ordinary differential equations.
- To Solve exact differential equations and Converts to separable and homogenous equations to exact differential equations by integrating factors.
- To Solve Bernoulli differential equations.
- To find the solution to higher-order linear differential equations.

Unit I: Recapitulation of Differential Equations of first order and first degree, Exact Differential equations, Necessary and sufficient condition for the equations to be exact, Reducible to the exact differential equations. **14hrs**

Unit II: Differential equations of the first order and higher degree: Equations solvable for p, x, y. Clairaut's equation and singular solution. Orthogonal trajectories of Cartesian and polar curves. **14hrs**

Unit III: Linear differential equations of the nth order with constant coefficients. Particular Integrals when the RHS is of the form e^{ax}, sin(ax+b), cos(ax+b), x^n, e^{ax} V and x V (with proofs), where V is a function of x. **14 hrs**

Reference Books:

1. M.D.Raisinghania, Ordinary Differential Equations & Partial Differential Equations, S. Chand & Company, New Delhi.
2. J. Sinha Roy and S Padhy: A Course of Ordinary and Partial Differential Equation Kalyani Publishers, New Delhi.
3. D Murray, Introductory Course in Differential Equations, Orient Longman (India)
4. W T Reid, Ordinary Differential Equations, John Wiley, New Delhi
5. M. L. Khanna, Differential Equations, Jai PrakashNath& Co. Meerut.
6. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984.

Open Elective Course

(For students of other than Science stream)

MATOET 3.1(B): Quantitative Mathematics	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100** **(SEE - 60 + IA - 40)**

Course Outcomes: This course will enable the students to:

- Understand number system and fundamental operations
- Understand the concept of linear quadratic and simultaneous equations and their applications in real life problems
- Understand and solve the problems based on Age.
- Solve Speed and Distance related problems.

Unit-I:NumberSystem

Numbers, Operations on Numbers,Tests on Divisibility, HCF and LCM of numbers. Decimal Fractions, Simplification, Square roots and Cube roots - Problems thereon. Surds and Indices. Illustrations thereon.

14 Hrs

Unit-II:Theory of equations

Linear equations, quadratic equations, simultaneous equations in two variables, simple application problems - Problems on Ages, Problems on conditional Age calculations, Present & Past age calculations. 14 Hrs

Unit-III:Quantitative Aptitude

Percentage, Average, Average Speed-problems.Time and distance, problems based on trains, problems on-work and time,work and wages, clock and calendar.

14 Hrs

Reference Books:

1. R.S. Aggarwal, *Quantitative Aptitude*, S. Chand and Company Limited, NewDelhi-110 055 .
2. Abhijit Guha, *QuantitativeAptitude*,5th Edition,Mc.Grawhillpublications.2014.
3. R V Praveen,*QuantitativeAptitudeand Reasoning*,PHI publishers.
4. R S Aggarwal, Objective Arithmetic, S. Chand & Company Ltd.
5. Qazi Zameerddin,Vijay K Khanna, S K Bhambri, *BusinessMathematics-II Edition.*
6. S. K. Sharma and Gurmeet Kaur, Business Mathematics , Sultan Chand & Sons.
7. Hazarika Padmalochan, A Text Book of Business mathematics for B.Com and BBA Course, Chand Publication.
8. J K Thukrol, Business Mathematics, abci book:2020 First Edition.
9. N. G. Das and J. K. Das, Business Mathematics and Statics, Mc Graw Hill Education, 2017.

Open Elective Course

(For Students of other than Science Stream)

MATOET 3.1(C): Vedic Mathematics	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100(S.A.- 60 + I.A. – 40)**

Course Outcomes: This course will enable the students to:

- Understand the vedic methods of arithmetic
- Understand the vedic methods of division with two/three digit divisor
- Understand the vedic methods of power and root power of two digit numbers

Unit-I: Multiplication:

1. Ekadhikenpurven method (multiplication of two numbers of two digits).
2. Eknunenpurven method (multiplication of two numbers of three digits).
3. Urdhvatiragbhyam method (multiplication of two numbers of three digits).
4. Nikhilam Navtashchramam Dashtaha (multiplication of two numbers of three digits).
5. Combined Operations. **14 Hours**

Unit-II: Division and Divisibility

Part A: Division

1. NikhilamNavtashchramamDashtaha (two digits divisor)
2. ParavartyaYojyet method (three digits divisor)

Part B:Divisibility

1. Ekadhikenpurven method (two digits divisor)
2. Eknunenpurven method (two digits divisor) **14 Hours**

Unit-III:

Power and Root Power:

1. Square (two digit numbers)
2. Cube (two digit numbers).

Root:

1. Square root (four digit number)
2. Cube root (six digit numbers).
3. Solution of linear simultaneous equations. **14 Hours**

Reference Books:

1. Vedic Mathematics, Motilal Banarsi Das, New Delhi.
2. Vedic Ganita: Vihangama Drishti-1, SikshaSanskritiUthana Nyasa, New Delhi.
3. Vedic GanitaPraneta, Siksha Sanskriti Uthana Nyasa, New Delhi.
4. Vedic Mathematics: Past, Present and Future, Siksha Sanskriti Uthana Nyasa, New Delhi.
5. Leelavati, ChokhambbaVidya Bhavan, Varanasi.
6. Bharatiya Mathematicians, Sharda Sanskrit Sansthan, Varanasi.

SEMESTER – IV

MATDSCT 4.1: Partial Differential Equations and Integral Transforms	
Teaching Hours: 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 56 Hours	**Max. Marks: 100 (SEE - 60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- Solve the Partial Differential Equations of the first order and second order
- Formulate, classify and transform partial differential equations into canonical form.
- Solve linear and non-linear partial differential equations using various methods; and apply these methods to solving some physical problems.
- Able to take more courses on wave equation, heat equation, and Laplace equation.
- Solve PDE by Laplace Transforms and Fourier Transforms

Partial Differential Equations:

Unit I: Basic concepts–Formation of a partial differential equations by elimination of arbitrary constants and functions, Solution of partial differential equations – Solution by Direct integration, Lagrange's linear equations of the form Pp + Qq = R , Standard types of first order non-linear partial differential equations, The integrals of the non-linear equation by Charpit's method. **14 Hrs**

Unit II: Homogeneous linear partial differential equations with constant coefficients. Partial differential equations of the second order. Classification of second-order partial differential equations, canonical forms. Classification of second order linear equations as hyperbolic, parabolic, and elliptic. Solutions of the Heat equation, Laplace equation and Wave equation (using separation of variables). **14 Hrs**

Integral Transforms:

Unit III: Laplace Transforms: Definition**,** Basic Properties. Laplace transforms of some standard functions. Laplace transform of Periodic functions. Laplace transform of derivative and integral of a function. Heaviside function. Dirac-delta function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms. **14 Hrs**

Unit IV: Fourier Series and Transforms: Periodic functions. Fourier Coefficients. Fourier series of functions with period 2 and period 2L. Fourier series of even and odd functions. Half range Cosine and Sine series. Fourier Transforms - Finite Fourier Cosine and Sine transform. Transforms of derivates**.** Applications of Fourier Transforms**.** **14 Hrs**

Reference Books:

1. D. A. Murray, Introductory Course in Differential Equations, Orient and Longman
2. H. T. H.Piaggio, Elementary Treatise on Differential Equations and their Applications, CBS Publisher & Distributors, Delhi,1985.
3. G. F. Simmons, Differential Equations, Tata McGraw Hill.

4. S. L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
5. M. D. Raisinghania, Ordinary Differential Equations & Partial Differential Equations, S. Chand & Company, New Delhi.
6. K.Sankara Rao, Introduction to Partial Differential Equations: PHI, Third Edition, 2015.
7. I. N. Sneddean, Elements of Partial differential equations, McGraw-Hill International Editions, 1986.
8. R. Murray and L. Spiegal (Schaum's Series), Laplace Transforms
9. Goel and Gupta, Laplace Transform.
10. Sudhir Kumar, Integral Transform Methods in Science & Engineering, CBS Engineering Series, 2017.
11. Murray R. Spiegal L, Fourier Transforms, Schaum' Series,
12. Earl David Rainville and Philip Edward Bedient–A short course in Differential Equations, Prentice Hall College Div; 6th Edition.
13. Sathya Prakash, Mathematical Physics, S Chand and Sons, New Delhi.

PRACTICALS

MATDSCP 4.1: Practical's on Partial Differential Equations and Integral Transforms	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Teaching Hours: 56 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Mathematics practical with Free and open Source Software (FOSS) tools for computer programs

Course Learning Outcomes: This course will enable the students to

- Learn Free and Open Source software (FOSS) tools or computer programming.
- Solve problems on Partial Differential Equations and Integral Forms
- To find Laplace transform of various functions
- To finf the Fourier Transform of periodic functions
- To solve differential equations by using Integral transforms.

Programs using Scilab/Maxima/Python:

Elements of Partial differential equations and Integral transforms using FOSS

1. Solutions of Linear Partial differential equations of type1 to type4 and Lagrange's method
2. Solutions of partial differential equation using Charpit's method.
3. Solutions of Second order homogenous partial differential equation with constant coefficients.
4. Solutions to the partial differential equations using separation of variables method (Heat/ Wave/Laplace).
5. Finding the Laplace transforms of some standard and periodic functions.
6. Finding the inverse Laplace transform of simple functions
7. Verification of Convolution Theorem.
8. To solve ordinary linear differential equation using Laplace transform.
9. To solve Integral equation using Laplace transform.
10. To find full range Fourier series of some simple functions with period 2 and 2L
11. To find Half range sine and cosine series of some simple functions and ploting them.
12. To find Cosine Fourier transforms.
13. To find Sine Fourier transforms.

Open Elective Course

(For students of Science stream who have not chosen Mathematics as one of the Core Course)

MATOET4.1(A): Partial Differential Equations	
Teaching Hours: 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100 (SEE-60 + I.A. – 40)**

Course Learning Outcomes: This course will enable the students to

- explain the concept of the differential equation.
- Classifies the differential equations concerning their order and linearity.
- Explains the meaning of the solution of a differential equation.
- solve first-order ordinary differential equations.
- Solves exact differential equations and Converts separable and homogenous equations to exact differential equations by integrating factors.
- Solves Bernoulli differential equations.
- Will be able to find the solution to higher-order linear differential equations.

Unit I: Basic concepts–Formation of a Partial differential equations by elimination of arbitrary constants and functions – Solution of partial differential equations – Solution by Direct integration, Lagrange's linear equations of the form Pp + Qq = R . **14 Hrs**

Unit II : Standard types of first order non-linear partial differential equations, The integrals of the non-linear equation by Charpit's method.Homogeneous Linear partial differential equations with constant coefficients. Partial differential equations of the second order. Classification of second-order partial differential equations, canonical forms.

14 Hrs

Unit III: Classification of second order linear equations as hyperbolic, parabolic, and elliptic. Solutions of the Heat equation, Laplace equation and Wave equation (using separation of variables). **14 Hrs**

Reference Books:

1. D.A. Murray, Introductory course in Differential Equations, Orient and Longman
2. H.T. H.Piaggio, Elementary Treatise on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi,1985.
3. G.F.Simmons, Differential Equations, Tata McGraw Hill 14
4. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
5. M.R. Speigel, Schaum's outline of Laplace Transform
6. M. D. Raisinghania, Ordinary Differential equations & Partial differential equations, S. Chand & Company, New Delhi.
7. K.Sankara Rao, Introduction to Partial Differential Equations: PHI, Third Edition, 2015.
8. I. N. Snedden, Elements of Partial differential equations,

OpenElective Course

(For students of other than science stream)

MATOET4.1(B) : Mathematical Finance	
Teaching Hours: 3Hours/week	**Credits: 3**
Total Teaching Hours:42Hours	**Max.Marks:100 (S.A-60+I.A.-40)**

Course Learning Outcomes: Thiscourse will enable the students to

- Understand how compute profit and loss, discount and Banker's discount.
- Understand the concept of Linear equations and inequalities and their use in the solving the Linear Programming Problems.
- Formulation of Transportation Problem and its application in routing problem.

Unit-I:Commercial Arithmetic

Bill of exchange, Bill of discounting procedure. Basic formula related to profit, loss, discount and brokerage, Successive discount, True discount, Banker's discount.

14 Hrs

Unit-II:Linear Programming

Linear equations and inequalities- Rectangular coordinates, straight line, parallel and intersecting lines and linear inequalities, Introduction to linear programming, Mathematical formulation of LPP, Solution of a LPP by graphical method, special cases in graphical method

14 Hrs

Unit-III:Transportation problem

Introduction, Formulation of Transportation problem, Initial basic feasible solution, Steps insolving a transportation problem, optimality check, special cases in Transportation problem. The Traveling salesman Problem (Routing Problem). **14 Hrs**

Reference Books:

1. R S Aggarwal, Objective Arithmetic, S. Chand & Company Ltd.
2. Mizrahi and Sullivan, Mathematics for Business and Social Sciences an Application approach.
3. Qazi Zameeruddin, Vijay K Khanna, S K Bhambri, Business Mathematics- II Edition, Vikas Publishing House.
4. S. Kalavathy, Operation Research, Fourth edition, Vikas publication house Pvt. Ltd.
5. Sreenivasa Reddy M, Operations Research 2nd edition, Sanguine Technical publishers, Bangalore.
6. S. D. Sharma, Operation Research,

Open Elective Course

(For students otherthan science stream)

MATOET 4.1 (C): Mathematics for Social Sciences	
Teaching Hours : 3 Hours/Week	**Credits: 3**
Total Teaching Hours: 42 Hours	**Max. Marks: 100 (S.A.- 60 + I.A. – 40)**

Course Learning Outcomes: Thiscourse will enable the students to

- Understand the mathematical concept of sets and counting problems.
- Understand the concept of Probalitity and its applications in social sciences.
- Understand the concept of limits and continuity of functions and its applications in business and social sciences.

Unit-I

Sets, counting, permutations, combinations, counting problems, binomial theorem and problems thereon. Probability – Introduction, sample space and assignment of probabilities, properties of the probability of an event, probability of equally likely events, conditional probability, Baye's formula and examples thereon.

14 Hours

Unit-II

Limit and continuity, Derivative- interpretation, derivative formulas, general derivatives for differentiation, composit functions, higher order derivaties and problems thereon.

14 Hours

Unit-III

Applications of the derivative – Relative maxima and Relative minima, Absolute maximum and Absolute minimum, Applied problems, Concavity, Asymptotes, Marginal analysis, Models- Maximizing tax revenue, Otimal trade-in time, and minimizing inventory cost.

14 Hours

REFERENCE BOOKS

1. Abe Mizrahi and Michael Sullivan, Mathematics for Business and Social Sciences and Applied Approach – Third Edition, Wieley.
2. Carl P. Simon and Lawrence Blume, Mathematics for Economists, Viva Books Private Limited, New Delhi, 2015.
3. L. Peccati, M. D'Amico and M. Cigola , Maths for Social Sciences, , Springer.

Annexure - 1

From,
Dr. Vasumathi Bhat,
Chairperson, Composite BOS in Sanskrit,
Mangalore University,
Mangalagangothri.

Date- 10-07-2024

To,
The Registrar (Academic)
Mangalore University,
Mangalagangothri.

RespectedSir,

Sub: Submission of Syllabus copy of Sanskrit Language for UG courses framed under SEP 2024). Ref: Your letter MU/Ku.Sa /Syndi/S5/9/2024-65555 Dated 09-07-2024.

With reference to the above subject, I am herewith submitting the syllabus copy of Sanskrit language for first and second semesters of all UG courses prepared by the Chairperson, Board members and a Special invitee for your approval. The syllabus is prepared according to the norms of State Education Policy 2024.

The proposed copy of syllabus is enclosed herewith for your kind persual and needful action.

Thanking you.

Yours Sincerely,

Dr. Vasumathi Bhat,
Chairperson, Composite BOS in Samskrit

Board Members and a Special Invitee (for BOS meeting) :

1. Dr. Vasumathi Bhat, — Chairperson
   Associate Professor,
   MGM College, Udupi - 2
2. Dr. Nagaraj B, — Member
   Associate Professor,
   Sridurga Samskrita Post Graduation Studies
   and Research center, Kateel, DK.

P.T.O.

3. Dr. Ramesh T S, Member
   Associate Professor,
   Poorna prajna College, Udupi.

4. Dr. Shreeshakumar M K, Member
   Assistant Professor,
   Sri Vivekananda College of Arts, Science and Commerce,
   Putturu, DK.

5. Sri Krishnaprasad K N, Member
   Principal,
   Srirama First Grade College, Kalladka, Bantwal, DK.

6. Prof. M.A. Shruthikeerthi Member
   Chairperson
   P.G. Studies of Sanskrit
   Kuvempu Universiry, Shimoga

7. Prof. Dr. Kumarasubrahmanya Bhat A., Special Invitee
   Dept. of Sanskrit
   University College, Hampanakatta Mangalore, DK.

MANGALORE UNIVERSITY

SYLLABUS FOR

UNDER GRADUATE PROGRAM (UG)

SANSKRIT LANGUAGE CURRICULUM FRAMEWORK

FRAMED ACCORDING TO THE STATE EDUCATION POLICY (SEP 2024)

(I& II SEMESTERS)

TO IMPLEMENT FROM THE ACADEMIC YEAR: 2024-25

FOR ALL COURSES

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY
MANGALAGANGOTHRI-574199

MANGALORE UNIVERSITY

Syllabus

For the year 2024-25 and onwards

Syllabus framed under State Education Policy-2024

SANSKRIT LANGUAGE

BA/BSW/BHRD/BVA/B.Sc/FND/BHS/BFD/

BID/BHM/BSA/BFT/BCS/B.Com/BCA/BBA

I&II semesters

Course pattern and scheme of examination for all U.G. Courses

CHAIR PERSON

BOARD OF STUDIES IN SANSKRIT

MANGALORE UNIVERSITY,

MANGALAGANGOTHRI-574199

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

I Semester: BA, BSW, BHRD and BVA

Sanskrit Language Paper-1
Title-Sanskrit Prose and Grammar — Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions – 40 Hours. 1. *Dharmaanushasanam* - 3 Hrs. 2. *Sagara katha* - 5 Hrs 3. *Saindhavaraaja garvaharanam* - 5 Hrs. 4. *Upaayam chintayeth praanjaha tatha apaayam cha* - 4 Hrs 5. *Shalyaparva* - 5 Hrs. 6. *Saagarollanghanam* - 5 Hrs. 7. *Simhaasanaprapthihi* - 4 Hrs. 8. *Kathaa chatustayam* - 6 Hrs. 9. *Vidyaya Vindathe Amrutam* - 3 Hrs.	65
2	Grammar - 8 Hours 1. Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice 4. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours- 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4= 08
5	Grammar (To be answered in Sanskrit only) *5.1* Choosing the right *Namapada* *5.2* Choosing the right *Sarvanamapada* *5.3* Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15x1=15
			Total Marks – 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Kriyapada* and Change of Voice.

Prescribed Textbook:

1. *Gadyasopanam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Divyaramayanam* - Swami Apoorvananda
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. *Bharathiyadarsana* - Dr. K. Krishnamurthy and Vid. N. Ranganatha Sharma

II Semester : BA, BSW, BHRD and BVA

Sanskrit Language Paper-2

Title – Sanskrit Poetry and Grammar

Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Subhashitani* - 5 Hrs. 2. *Guha samaagamaha* - 5 Hrs. 3. *Vande Guruparamparam* - 5 Hrs. 4. *Dwaadasha gathaaha* - 6 Hrs. 5. *Kalidasasya namrataa* - 4 Hrs. 6. *Chanakyaneetihi* - 5 Hrs. 7. *Chamatkaarashlokaaha* - 5 Hrs. 8. *Kaviprashamsa* - 5 Hrs.	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1) Identifying of *Samasa* 5.2) *Krudantha* 5.3) *Tadhitha* 5.4) *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya,* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Tadhitha* and *Samasa.*

Prescribed Textbook:

1. *Padyasopanam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) *Subhashitha Rathna Bhandagaram* - Enlarged and re-edited with sources etc by Rama Narayana Acharya '*Kavyatirtha*'

   (b)*Subhasithagalu* - Kannada Sahitya Parishath
2. a)*The Ramayana of Valmiki* - Wasudeva Laxmana Shastri Pansikar
   b) *Shreemad Valmikiramayanam* - Bharathadarshana Prakashana
   c) *Shreemad Valmikiramayanam* - Vidwan N. Ranganatha Sharma
3. *Raghuvamsha* - Mahakavyam of Mahakavi Kalidasa
4. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri
5. *Roopachandrika* - Choukhambha Sanskrit Pustakalaya

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

	I Semester: B.Com	
	Sanskrit Language Paper-1 Title – Sanskrit Prose and Grammar Maximum Marks:100	
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Acharyaanushasanam* - 3 Hrs. 2. *Seeta swayamvaraha* - 5 Hrs. 3. *Gadaayuddham* - 5 Hrs. 4. *Chandrabhoopatihi* - 5 Hrs. 5. *Rajyashreepraptihi* - 5 Hrs. 6. *Paramahamsopadeshaha* - 5 Hrs. 7. *Vineetaha Upamanyuhu* - 3 Hrs. 8. *Shantiparva* - 5 Hrs. 9. *Swargavarnanam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* 6. Identifying *Kriyapadas - Pancha Lakaras* 7. Change of Voice 8. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	5X2=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X 1= 15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Harshacharitha* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Shabdha Parichaya, Namapadas, Sarvanamapadas, Avyayas, Kriyapadas* and Change of Voice.

Prescribed Textbook:

1. *Gadyavaibhavam*, Published by Mangalore University Sanskrit Teachers Association

Reference Books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. *Harshacharitam* - Banabhatta
6. *Nialakantavijaya Champu* - Nilakantadeekshitha

II Semester: B.Com

Sanskrit Language Paper-2

Title- Sanskrit Poetry and Grammar — Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Saduktikarnamrutam* - 6 Hrs 2. *Devaha Manusharoopena Charanti* - 5 Hrs 3. *Gurustavaha* - 4 Hrs 4. *Gathamahodadhihi* - 5 Hrs 5. *Parvatyaha Ugram Tapaha* - 6 Hrs 6. *Viduraneetihi* - 4 Hrs 7. *Chitrasamskrutam* - 6 Hrs 8. *Kavireva Prajapathihi* - 4 Hrs	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination

Duration of Examination – 3 Hrs. — **Max. Marks - 80**

1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Ramayana, Mahabharatha, Mahakavya,* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyavaibhavam,* Published by Mangalore University Sanskrit Teachers Association

Reference books:

1.	(a) *Subhashitha Rathna Bhandagaram*	-	Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
	(b) *Subhasithagalu*	-	Kannada Sahitya Parishath
2.	a) *The Ramayana of Valmiki*	-	Wasudeva Laxman Shastri Pansikar
	b) *Shreemad Valmikiramayanam*	-	Bharathadarshana Prakashana
	c) *Shreemad Valmikiramayanam*	-	Vidwan N. Ranganatha Sharma
3.	a) *Kumarasambhavam*	-	Mahakavyam of Mahakavi Kalidasa – Shesharaja Sharma
	b) *Kumarasambhavam*	-	Choukhambha Sanskrit Granthamala
1.	*Samskritha Vyakarana Sangraha*	-	Vidwan Bailooru Narayana Thantri

STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

I Semester: B.Sc/FND/BHS/BFD/BID/BHM/BSA/BFT/BCS

Sanskrit Language Paper-1
Title – Sanskrit Prose and Grammar
Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Taittiriyopanishadi Jeevanamoulyaam* - 3 Hrs. 2. *Jatayuprasangaha* - 5 Hrs. 3. *Ashwathamaa Hato Naro Va Kunjaro Va* - 5 Hrs. 4. *Apareekshya Na Kartavyam* - 5 Hrs. 5. *Gograhanam* - 5 Hrs. 6. *Narashimhapradurbhaavaha* - 4 Hrs. 7. *Kapinjalasyopadeshaha* - 5 Hrs 8. *Chikago Upanyasaha* - 4 Hrs. 9. *Shrividyaaranyaha* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice *4. Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X1=15
			Total Marks - 80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari* etc to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyaprasoonam,* Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Panchathantram* - Vishnusharma
4. *Bharathasangraha* - Lakshmanasoori
5. a) *Kadambari* - Dr. Bannanje Govindacharya
   b) *Kadambari* - Banabhatta
6. *Swami Vivekananda* - Ramakrishna Sharma

II Semester: B.Sc/FND/BHS/BFD/BID/BHM/BSA/BFT/BCS		
Sanskrit Language Paper-2 Title- Sanskrit Poetry and Grammar		Maximum Marks:100
1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Sooktimuktavalihi* - 6 Hrs. 2. *Satyaannasti Param Padam* - 5 Hrs. 3. *Tasmai Shri Gurave Namaha* - 4 Hrs. 4. *Sarasaaha Gathaaha* - 5 Hrs 5. *Indramanmathayoho Samvadaha* - 5 Hrs. 6. *Srikrishnaleelaha* - 5 Hrs. 7. *Chitrakavyam* - 6 Hrs. 8. *Mahakavishamsanam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. *Krudantha* 2. *Karaka Prakaranam* 3. *Tadhitha* 4. Identifying *Samasas*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15 x 1=15
			Total Marks-80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya, Chitrakavyam* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyaprasoonam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1.	(a) *Subhashitha Rathna Bhandagaram*	-	Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
	(b) *Subhasithagalu*	-	Kannada Sahitya Parishath
2.	a) *The Ramayana of Valmiki*	-	Wasudeva Laxmana Shastri Pansikar
	b) *Shreemad Valmikiramayanam*	-	Bharathadarshana Prakashana
	c) *Shreemad Valmikiramayanam*	-	Vidwan N. Ranganatha Sharma
3.	a) *Kumarasambhavam*	-	Mahakavyam of Mahakavi Kalidasa - Shesharaja Sharma
	b) *Kumarasambhavam*	-	Choukhambha Sanskrit Granthamala
4.	*Shrikrishnakarnamrutham*	-	Leelashukaha
5.	*Samskritha Vyakarana Sangraha*	-	Vidwan Bailooru Narayana Thantri

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024-25 ONWARDS

	I Semester: BBA	
	Sanskrit Language Paper-1 Title-Sanskrit Prose and Grammar Maximum Marks:100	
1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Shishyopadeshaha* - 3 Hrs. 2. *Lankapuridahanam* - 5 Hrs. 3. *Paashupataastra Sampadanam* - 5 Hrs. 4. *Mandukaaha Sarpamadhirohanti* - 4 Hrs. 5. *Swargaarohanaparva* - 5 Hrs. 6. *Vaayasolookaanaam vairotpattihi* - 4 Hrs. 7. *Harisharmakathaa* - 4 Hrs. 8. *Gajendramokshaha* - 5 Hrs. 9. *Kathaachatushtayam* - 5 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas* and *Avyayas* 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only)	15out of 20	15X1=15
	5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* *5.3* Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*		Total Marks - 80

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Mahakavyam* etc. to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyamoukthikam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Gadya Bharatam* - Shivadatta Thripathi
4. *Panchathantram* - Vishnusharma
5. *Bharathasangraha* - Lakshmanasoori
6. *Kumarasambhavam* - Kalidasa
7. *Harisharmakatha* - *Somadevana Kathasarithsagara*
8. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

II Semester: BBA		
	Sanskrit Language Paper-2 Title – Sanskrit Poetry and Grammar	Maximum Marks:100
1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours 1. *Subhashita Swarasyam* - 4 Hrs. 2. *Shri Sadaashivaanugraha* - 5 Hrs. 3. *Shriguruvandanam* - 4 Hrs. 4. *Gaathaavallari* - 6 Hrs. 5. *Dileepa Simhasamvadaha* - 6 Hrs. 6. *Vidhuropadishtani Moulyani* - 5 Hrs. 7. *Chaatukavyam* - 6 Hrs. 8. *Vande Kaviparamparaam* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice 4. *Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyamoukthikam*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. a) *SubhashithaRathnaBhandagaram* - Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
   b) *Subhasithagalu* - Kannada Sahitya Parishath
2. *Raghuvamshaha* - Kalidasa
3. *Shreemanmahabharatha* - Bharathadarshana Prakashana
4. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board Of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDERGRADUATE COURSES
SEMESTER SCHEME 2024 - 25 ONWARDS

I Semester : BCA

Sanskrit Language Paper-1
Title-Sanskrit Prose and Grammar
Maximum Marks:100

1	Introduction to Sanskrit Prose – Selected portions from Sanskrit Prose compositions - 40 Hours. 1. *Snatakopadeshaha* - 4 Hrs. 2. *Shoorpanakha Naasaachedaha* - 5 Hrs. 3. *Yadaveeyakalaha* - 4 Hrs. 4. *Lobhaha Dhukasya Kaaranam* - 4 Hrs. 5. *Shukacharitam* - 5 Hrs. 6. *Shriraamaavataaraha* - 6 Hrs. 7. *Mahaashwetha saantvanam* - 5 Hrs. 8. *Baahubali vairaagyam* - 4 Hrs. 9. *Bhartruhari Nirvedaha* - 3 Hrs.	65
2	Grammar - 8 Hours. *1.* Identifying *Namapadas/ Sarvanamapadas* 2. Identifying *Kriyapadas and Avyayas* 3. Change of Voice 4. Sentence Formation	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Choosing the right *Namapada* 5.2 Choosing the right *Sarvanamapada* 5.3 Choosing the right *Kriyapada* 5.4 Change of Voice 5.5 *Shabda Parichaya*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Prose Literature along with Modern Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- Texts from *Ramayana, Mahabharatha, Upanishad, Panchatantra, Kadambari, NeethiShatakam* etc. to enrich the imaginative and creative abilities of the students.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Namapada, Sarvanama, Lakaras, Shabda Parichaya* and Change of Voice

Prescribed Textbook:

1. *Gadyachandrika*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Upanishad Bhavadhare* - Swami Somanathananda
2. *Gadya Ramayanam* - Shivadatta Thripathi
3. *Gadya Bharatam* - Shivadatta Thripathi
4. *Panchathantram* - Vishnusharma
5. a) *Kadambari* - Banabhatta
   b) *Banabhattana Kadambari* - Dr. Bannanje Govindacharya
6. *Samskritha Vyakarana Sangraha* - Vidwan Bailooru Narayana Thantri

II Semester: BCA

Sanskrit Language Paper-2
Title – Sanskrit Poetry and Grammar

Maximum Marks:100

1	Introduction to Sanskrit Poetry- Selected portions from Sanskrit Poetic Compositions - 40 Hours. 1. *Subhashitasudhaanidhihi* - 5 Hrs. 2. *Matsyavataaraha* - 5 Hrs. 3. *Nidhihi sarvavidyanaam* - 5 Hrs. 4. *Gathaamanjari* - 5 Hrs 5. *Kailase Vasantaprabhaavaha* - 6 Hrs. 6. *Koutilyaneethihi* - 5 Hrs. 7. *Shlokachamatkaaraha* - 5 Hrs. 8. *Shlaghyaha kavayaha* - 4 Hrs.	65
2	Grammar - 8 Hours. 1. Identifying *Namapadas/ Sarvanamapadas* *2.* Identifying *Kriyapadas - Pancha Lakaras* 3. Change of Voice *4. Shabda Parichayaha*	15
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours- 4 per week** Total Teaching Hours - 48 CREDITS–3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Shlokas*	2 out of 3	2X5=10
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	4 out of 6	4X8=32
4	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
5	Grammar (To be answered in Sanskrit only) 5.1 Identifying of *Samasa* 5.2 *Krudantha* 5.3 *Tadhitha* 5.4 *Karaka*	15 out of 20	15X1=15
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Poetry.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances. They develop the ability to use language in a descriptive way.
- This course helps students get to know about *Subhashitas, Itihasakavya, Mahakavya, Bhagavatha Purana* etc. and the various *Chandas* used in Sanskrit Poetry.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language and Grammar.
- Grammar is an integral part of a language class, where in students are trained to speak and write in Sanskrit without errors.
- This semester focuses on *Krudantha, Karaka, Samasa* and *Thadhithas.*

Prescribed Textbook:

1. *Padyachandrika*, Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. (a) *Subhashitha Rathna Bhandagaram* - Enlarged and re-edited with sources etc. by Rama Narayana Acharya 'Kavyatirtha'
   (b) *Subhasithagalu* - Kannada Sahitya Parishath
2. *Shreemad Bhagavathamahapurana* - Bharathadarshana Prakashana
3. *Shreemanmahabharatha* - Bharathadarshana Prakashana
4. a) *Kumarasambhavam* - Mahakavyam of Mahakavi Kalidasa - Acharya Shesharaja Sharma
   b) *Kumarasambhavam* - Choukhambha Sanskrit Granthamala

Chairperson, BOS in Sanskrit
Mangalore University

MANGALORE UNIVERSITY

Sanskrit Optional Course

Five credits each

UNDER GRADUATE

BA

Syllabus framed under State Education policy - 2024

SYLLABUS

For the year 2024-2025 and onwards

I & II SEMESTERS

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI - 574199

I SEMESTER B.A SANSKRIT OPTIONAL
PAPER – I

Syllabus	Marks	Hours
1. Samskritha Saahitya Parichaya	15	9
2. Vyakarana Parichaya mattu Pravesha	45	27
3. Mahabharatha Yakshaprashne	30	18
4. 108 Subhashitaani (poorvardha)	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours- 4 per week Total Teaching Hours - 48 CREDITS - 3		

Scheme of Examination:			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.1	Main Question	1 out of 2	1X8 = 8
1.2	Explanation	2 out of 4	2X4 = 8
2.1	Fill in the Blanks	10 out of 15	10X1 =10
2.2	Write the Forms of words	2 out of 4	2X5= 10
2.2	Questions for Essay Type Answer	1 out of 2	1X8 = 8
2.3	Subject Explanation	1 out of 2	1X8 = 8
2.4	Short notes	2 out of 4	2X5 = 8
3.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
3.2	Story Writing	1 out of 2	1X8 = 8
3.3	Reference to context	3 out of 5	3X3 = 9
3.4	Answering the **Passage** Question	5 out of 5	5X1 = 5
4.1	Questions for Essay Type Answer	2 out of 3	2X4 = 8
4.2	Explanation of *Shlokas*	2 out of 3	2X4 = 8
4.3	Short notes	2 out of 4	2X4 = 8
4.4	Reference to context	2 out of 4	2X3 = 6
	Total		**120**

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Mahabharatha* and *Shubhashita* is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Saahitya Charitre*, Government Publication Bengalore.
2. *Sanskrit Kannada Swayam Shikshak / Vyakarana Pravesha*, Bailooru Narayana Tantri, Chowkhamba Publication.
3. *108 Subhashitani (Poorvardha),* Medha Publication.

II SEMESTER B.A SANSKRIT OPTIONAL

Syllabus	Marks	Hours
1. *Gadya, Katha Kaavya*	15	9
2. *Vyakarana Parichaya Mattu Pravesha*	15	9
3. *Laghu Siddhanta Koumudi - Samnja Prakarana*	30	18
4. *Kapinjala Upadeshaha*	30	18
5. *Panchatantra Kathaa (Raktamukha Vaanaraha, Dharmabuddhihi)*	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours- 6 per week Total Teaching Hours - 72 CREDITS - 3		

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.1	Main Question	1 out of 2	1X7 = 7
1.2	Explanation	2 out of 4	2X4 = 8
2.1	Answering in one word	5 out of 7	5X1 = 5
2.2	Verb and Noun	2 out of 4	2X5 = 10
3.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
3.2	Explanation of *Sootra*	2 out of 4	2X4 = 8
3.3	Short notes	2 out of 4	2X4 = 8
3.4	*Samjna Sootra* Writing	3 out of 5	3X2 = 6
4.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
4.1	Explanation of *Shlokas*	2 out of 3	2X4 = 8
4.2	Short notes	2 out of 4	2X4 = 8
4.3	Reference to context	2 out of 4	2X3 = 6
5.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
5.2	Explanation of *Gadya*	2 out of 3	2X4 = 8
5.3	Short Notes	2 out of 4	2X4 = 8
5.4	Reference to context	2 out of 4	2X 3 = 6
	Total		**120**

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Panchatantra* and Prose Literature is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Saahitya Charitre*, Government Publication Bengalore.
2. *Sanskrit Kannada Swayam Shikshak / Vyakarana Pravesha*, Bailooru Narayana Thantri, Chowkhamba Publication.
3. *Laghu Siddhanta Ko*[i]*umudi*, Chowkamba Publication.

Annexure - 1

Date: 10-07-2024
Place: Udupi.

From,

Dr. Vasumathi Bhat,

Chairperson, Composite BOS in Sanskrit,
Mangalore University, Mangalagangothri.

To,

The Registrar (Academic)
Mangalore University,
Mangalagangothri.

Respected Sir,

Sub: Submission of Syllabus copy of Sanskrit Language UG courses (SEP 2024).
Ref: Your letter MU/Ku.Sa/Syndi/S5/9/2024-65555 Date 09-07-2024
regarding submission of syllabus.

With reference to the above subject, I am herewith submitting the syllabus copy of Sanskrit language framed under SEP 2024 for third and fourth semesters of all UG courses with Open Elective (OE), third to sixth semesters of Discipline Core Courses prepared by the Chairperson, board members and a special invitee for your approval. The syllabus is prepared according to the norms of State Education Policy 2024.

The proposed copy of syllabus is enclosed here with for your kind persual and needful action.

Thanking you.

Yours Sincerely,

Dr. Vasumathi Bhat,
Chairperson, Composite BOS in Samskrit.

Board Members and a Special Invitee (for BOS Meeting):

1. Dr. Vasumathi Bhat,
   Associate Professor, Chairperson
   MGM College, Udupi.
2. Dr. Nagaraj B,
   Associate Professor, Member
   Sridurga Samskrita Post Graduation Studies
   and Research center, Kateel, DK.

P.T.O.

3. Dr. Ramesh T S,
   Associate Professor, Member
   Poornaprajna College, Udupi.
4. Dr. Shreeshakumar M K, Member
   Assistant Professor,
   Sri Vivekananda College of Arts, Science and Commerce,
   Puttur

5. Sri Krishnaprasad K N, Member
   Principal,
   Srirama First Grade College, Kalladka, Bantwal

6. Prof. M A Shruthikeerthi Member
   Chairperson
   P.G. Studies of Sanskrit
   KuvempuUniversiry, Shimoga

7. Prof. Kumarasubrahmanya Bhat, Special Invitee
   Dept. of Sanskrit
   University College, Mangalore

MANGALORE UNIVERSITY

SYLLABUS FOR

UNDER GRADUATE PROGRAM (UG) SANSKRIT

LANGUAGE CURRICULUM FRAME WORK

FRAMED ACCORDING TO THE STATE EDUCATION POLICY (SEP 2024)

(III & IV SEMESTERS)

TO IMPLEMENT FROM THE ACADEMIC YEAR 2025-26

FOR ALL COURSES

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY
MANGALAGANGOTHRI - 574199

MANGALORE UNIVERSITY

Syllabus

For the year 2025-26 and onwards

Syllabus framed under State Education Policy -2024

SANSKRIT LANGUAGE

BA/BSW/BHRD/BVA/B.Sc/FND/BHS/BFD/

BID/BHM/BSA/BFT/BCS/B.Com/BCA/BBA

III & IV semesters

Course pattern and scheme of examination for all U.G. Courses

CHAIRPERSON

BOARD OF STUDIES IN SANSKRIT

MANGALORE UNIVERSITY,

MANGALAGANGOTHRI - 574199

MANGALORE UNIVERSITY STATE
EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE UNDER
GRADUATE COURSES SEMESTER SCHEME
2025-26 ONWARDS

III Semester: BA, BSW,BHRD and BVA		
Sanskrit Language Paper-3 Title – Drama and Dramaturgy Maximum Marks: 100		
1	Unit 1: Introduction to Sanskrit Drama and Dramaturgy Origin and development of Sanskrit Drama - *Dasharupakas and their Lakshana* Important Dramas and Dramatists in Sanskrit Literature. - 10 Hours	20
2	Unit 2: *Pratimanatakam* 1-3 *Anka* - 26 Hours. *Alankara - Upama, Roopakam, Utpreksha, Arthantarnyasaha, Anuprasaha, Yamakam* - 6 Hours. *Chandas - Anushtup, Indravajra, Upendravajra, Vasantatilaka, Malini, Mandakranta* -6 Hours.	60
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours - 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Padya*	2 out of 4	2X6=12
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 4	2X6=12
5	Short notes (To be answered in Sanskrit only)	2 out of 4	5X2=10
6	*Alankara*	1 out of 3	1X5=05
7	*Chandas*	1 out of 3	1X5=05
8	Grammer	5 out of 8	1X5=05
			Total Marks – 80

Learning Outcomes:

- This course aims to acquaint the students with popular Classical Dramas in Sanskrit literature.
- The course also teaches in detail the origin, development and *Lakshanas* of Sanskrit Drama, which gives in depth knowledge on Sanskrit Literature.
- Sanskrit Dramas not only reflect prose and poetic excellence but also depicts contemporary society and highlights human values, which helps the students.
- The students also learn the theoretical aspects related to the production of the play. The concepts like *Rasa, Bhava, Abhinaya* are blended into the teaching learning of the play.
- The semester also focuses on *Chandas* and *Alankara*, which enables students learn to compose *Shlokas* and recite them.

Prescribed Textbook:

1. *Pratimanatakam* - Published by Mangalore University Sanskrit Teachers Association.

Reference books:

1. *Bhasanatakachakram* - Vyakhyana by Acharya Baladevananda. Upadhyaya, Choukhamba Sanskrit Series Varanasi.

2. *Shree vishvanatha kaviraja praneetaha Sahityadarpanaha* - Vyakhyana by Krishnamohanashastri Choukhamba Samskrit Samsthana, Varanasi.

3. *Pratimanatakam* - Translated by Vidwan Mysuru Seetharama Shastri.

4. *Pratimanatakam* - Translated by Dr. K. Krishnamurthy.

5. *Samskruthanataka* - Prof. A. R. Krishnashastri.

6. *Bhasamahakavi* - Prof. C. K. Venkataramayya.

7. *Dasharoopakam* - Dhananjaya.

IV Semester: BA, BSW, HRD and BVA

Sanskrit Language Paper-4

Title – *Nirvahanashastram*

Maximum Marks: 100

1	*Nirvahanashastram* 1. *Bhaktiyogaha* - 8 Hours. 2. *Mahabharate Nirvahanashastram* - 7 Hours. 3. *Ashtangayogaha* - 7 Hours. 4. *Pratyutpannamatitvam* - 3 Hours. 5. *Shukraneetihi* - 5 Hours. 6. *Indriyajayaha* - 5 Hours. 7. *Haasyakanikaaha* - 4 Hours. 8. *Prahelikaaha* - 4 Hours. 9. *Aitihasika kathaha* - 5 Hours.	80
2	Internal Assessment Tests, Seminars, Assignments	20
3	**Teaching hours - 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Translation and Explanation of *Padya*	2 out of 3	2X5=10
3	Explanation for given quotes	4 out of 7	4X3=12
4	Word Elaboration	2 out of 4	2X3=06
5	Questions for Essay Type Answer	2 out of 3	2X8=16
6	Short Notes	2 out of 3	2X5=10
7	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4=08
8	Match the following	4 out of 6	4X1=04
9	Fill in the blanks	4 out of 6	4X1=04
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with Sanskrit miscellaneous texts.
- The miscellaneous Sanskrit literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values, which would help students in their daily lives.
- The students in this semester are also introduced to specific texts in keeping with their course of study.
- The students of Arts study portions *Nirvahanashastra* as depicted in *Mahabharatha, Ashtangayoga* in *Yogashastra, Indriyavijaya, Manonigraha* from *Koutilya's Arthashastra, Bhagavadgeeta*, which would not only help in their course of study but also allows them imbibe moral values and life skills.
- The semester also focuses on *Prahelikas*, which enables students learn certain proverbs which have hidden in depth meaning and explanation. Understanding these would improve the writing and public speaking skills of students.

Prescribed Textbook:

1. *Nirvahanasopanam* - Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Samskrutha Bhashashastra mattu Sahityacharitre* - Dr. K. Krishnamurthy, Vidwan N. Ranganathasharma and Vidwan H. K. Siddagangayya
2. *Shreemad Bhagavadgeetha* - Swamy Ramasukadas
3. *Shrimanmahabharatha* - Bharata Darshana Prakashana
4. *Pantanjala Yogashastram* - Swami Adidevananda
5. *Koutaleeya Arthashastram* - Koutilyacharya
6. *Sandarbhasooktihi* - Vidwan Ranganathasharma

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
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UNDER GRADUATE COURSES
SEMESTER SCHEME 2025-26 ONWARDS

	III Semester: B.Com	
	Sanskrit Language Paper-3 Title – Drama and Dramaturgy Maximum Marks: 100	
1	Unit 1: Introduction to Sanskrit Drama and Dramaturgy Origin and development of Sanskrit Drama - *Dasarupakas* and their *Lakshana*, Important Dramas and Dramatists in Sanskrit Literature. - 10 Hours	20
2	Unit 2: *Pancharatram* - 26 Hours. *Alankara* - *Upama, Roopakam, Utpreksha, Arthantarnyasaha, Anuprasaha, Yamakam* - 6 Hours. *Chandas* - *Anushtup, Indravajra, Upendravajra, Vasantatilaka, Malini, Mandakranta* - 6 Hours.	60
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Padya*	2 out of 4	2X6=12
2	Explanation for given quotes	5 out of 7	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 4	2X6=12
5	Short notes (To be answered in Sanskrit only)	2 out of 4	5X2=10
6	*Alankara*	1 out of 3	1X5=05
7	*Chandas*	1 out of 3	1X5=05
8	Grammer	5 out of 8	1X5=05
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with popular Classical Dramas in Sanskrit literature.
- The course also teaches in detail the origin, development and *Lakshanas* of Sanskrit Drama, which gives in depth knowledge on Sanskrit Literature.
- Sanskrit Dramas not only reflect prose and poetic excellence but also depicts contemporary society and highlights human values, which helps the students.
- The students also learn the theoretical aspects related to the production of the play. The concepts like *Rasa, Bhava, Abhinaya* are blended into the teaching learning of the play.
- The semester also focuses on *Chandas and Alankara*, which enables students learn to compose *Shlokas* and recite them.

Prescribed Textbook:

1. *Pancharatram* - Published by Mangalore University Sanskrit Teachers Association

Reference Books:

1. *Bhasanatakachakram* - Vyakhyana by Acharya Baladevananda Upadhyaya, Choukhamba Samskrit Series, Varanasi.

2. *Shree vishvanatha kavirajapraneetaha Sahityadarpanaha* - Vyakhyana by Krishnamohanashastri Choukhamba Samskrit Samsthanam, Varanasi.

3. *Shreebhasapraneetam Pancharatram* - With Introduction, English and Kannada Translation, Notes edt. by Vidyaratna, Pandit S Rangachar

4. *Vishvanatha Virachita Sahityadarpana* - Translated by Dr. T G Siddapparadhya

5. *Bhasamahakavi* - Prof. C K Venkataramayya

6. *Dasharoopakam* - Dhananjaya

IV Semester: B.Com		
Sanskrit Language Paper-4 Title – *Samskrute Vanijyam* Maximum Marks: 100		
1	*Samskrute Vanijyam* 1. *Koutaleeya Arthasangrahaha* - 7 Hours. 2. *Geetayam Nirvahanashastram* - 7 Hours. 3. *Pracheenam Rajyashastram* - 7 Hours. 4. *Krishiparasharaha* - 7 Hours 5. *Jyothihi Shaastrasya Itihasaha* - 7 Hours. 6. *Kushaagramatihi Vaanaraha* - 4 Hours. 7. *Patralekhanam* - 6 Hours. 8. *Loukika Nyayaha* - 3 Hours.	80
2	Internal Assessment Tests, Seminars, Assignments	20
3	**Teaching hours - 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Explanation for given quotes	5 out of 8	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 3	2X6=12
5	Letter Writing	1 out of 2	1X8=08
6	Explanation of Nyayas	2 out of 4	2X4=08
7	Match the following	5 out of 6	5X1=05
8	Fill in the blanks	6 out of 8	6X1=06
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to acquaint the students with Sanskrit miscellaneous texts.
  - The miscellaneous Sanskrit literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values, which would help students in their daily lives.
  - The students in this semester are also introduced to specific texts in keeping with their course of study.
  - The students of Commerce will study *Arthaneeti, Rajaneeti* from Kautilya's *Arthashastram*, Management and Administration Skills, *Manonigraha* from *Bhagavadgeeta*, Taxation, *Raajaneeti, Adhikara Vikendrikarana* from *Mahabharata*, Agriculture from *Krishiparashara* which would not only help in their course of study but also allows them imbibe moral values and life skills.
- Students are also introduced to the art of Letter Writing and Resume Writing in Sanskrit.
  - The semester also focuses on *Nyayas*, which enables students learn certain proverbs which have hidden in depth meaning and explanation. Understanding these would improve the writing and public speaking skills of students.

Prescribed Textbook:

1. *Vanijyavaibhavam* - Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Samskrutha Bhashashastra mattu Sahityacharitre* - Dr K Krishnamurthy, Vidwan N Ranganathasharma and Vidwan H K Siddagangayya
2. *Shreemad Bhagavadgeetha* - Swamy Ramasukadas
3. *Shrimanmahabharatha* - Bharata Darshana Prakashana
4. *Koutaleeyam Arthashastram* - Acharya Koutilya
5. *Krishiparasharaha* - Parasharamuni
6. *Sandarbhasooktihi* - Vidwan Ranganathasharma
7. *Loukika Nyayakoshaha* - Dr. Pramod Ganesh Laale, translated to Sanskrit by Dr. Penna Madhusoodana

MANGALORE UNIVERSITY
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SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
SEMESTER SCHEME 2025-26 ONWARDS

III Semester: BSC/FND, BHS, BFD, BID, BHM, BSA, BFT and BCS		
Sanskrit Language Paper-3 Title – Drama and Dramaturgy Maximum Marks: 100		
1	Unit 1: Introduction to Sanskrit Drama and Dramaturgy Origin and development of Sanskrit Drama - *Dasarupakas* and their *Lakshana*, Important Dramas and Dramatists in Sanskrit Literature. - 10 Hours.	20
2	Unit 2: *Pratijnayougandharayanam* - 26 Hours. *Alankara - Upama, Roopakam, Utpreksha, Arthantarnyasaha, Anuprasaha, Yamakam* - 6 Hours. *Chandas - Anushtup, Indravajra, Upendravajra, Vasantatilaka, Malini, Mandakranta* - 6 Hours.	60
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Padya*	2 out of 4	2X6=12
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 4	2X6=12
5	Short notes (To be answered in Sanskrit only)	2 out of 4	5X2=10
6	*Alankara*	1 out of 3	1X5=05
7	*Chandas*	1 out of 3	1X5=05
8	Grammer	5 out of 8	1X5=05
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with popular Classical Dramas in Sanskrit literature.
- The course also teaches in detail the origin, development and *Lakshanas* of Sanskrit Drama, which gives in depth knowledge on Sanskrit Literature.
- Sanskrit Dramas not only reflect prose and poetic excellence but also depicts contemporary society and highlights human values, which helps the students.
- The students also learn the theoretical aspects related to the production of the play. The concepts like *Rasa, Bhava, Abhinaya* are blended into the teaching learning of the play.
- The semester also focuses on *Chandas* and *Alankara*, which enables students learn to compose Shlokas and recite them.

Prescribed Textbook:

2. *Pratijnayougandharayanam* - Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Bhasanatakachakram* - Vyakhyana by Acharya Baladevananda Upadhyaya, Choukhamba Samskrit Series, Varanasi.

2. *Shree vishvanatha kavirajapraneetaha Sahityadarpanaha* - Vyakhyana by Krishnamohanashastri. Choukhamba Samskrit Samsthanam, Varanasi.

3. *Samskruthanataka* - Prof. A. R. Krishnashastri.

4. *Bhasakavi* - Prof. A. R. Krishnashastri.

5. *Pratijnayougandharayanam* - Vyakhyana by Pandit Kapiladevagiri, Choukamba Vidya Bhavan, Varanasi.

6. *Pratijnayougandharayanam* - Vyakhyana by Pandit Vaidyanath Jha, Choukhamba Saraswati Bhavan, Varanasi.

7. *Pratijnayougandharayanam* - Edited by Prof. M. P. L. Shastri, published by Prasaranga, Mysuru University.

8. *Samskruta sahityapravesha* - Edited by Prof. V. R. Joshi, Kumta, Umaprakashana, Baggona.

9. *Dasharoopakam* - Dhananjaya.

IV Semester: BSc, BSc/FND, BHS, BFD, BID, BHM, BSA, BFT, BCS

Sanskrit Language Paper-4
Title – *Samskrute Vijnanam*

Maximum Marks: 100

1	*Samskrute Vijnanam* 1. *Jnanayogaha* - 7 Hours. 2. *Sasyajeevavaividhyam* - 6 Hours. 3. *Dinacharyapradeepika* - 6 Hours. 4. *Ayurvedasubhashitani* - 6 Hours 5. *Pracheenam Rasayanashastram* - 6 Hours. 6. *Patanjala Yogadarshanam* - 8 Hours. 7. *Taambulasya Trayodashagunaaha* - 4 Hours. 8. *Ouchityapranja Tatha Sanmitrataa* - 5 Hours.	80
2	Internal Assessment Tests, Seminars, Assignments	20
3	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Explanation for given quotes	5 out of 8	5X3=15
3	Questions for Essay Type Answer	3 out of 5	3X8=24
4	Short Notes	2 out of 4	2X5=10
5	Short notes (To be answered in Sanskrit only)	2 out of 4	1X5=10
6	Match the following	5 out of 6	5X1=05
7	Grammer	6 out of 8	6X1=06
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to acquaint the students with Sanskrit miscellaneous texts.
- The miscellaneous Sanskrit literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values, which would help students in their daily lives.
- The students in this semester are also introduced to specific texts in keeping with their course of study.
- The students of Science study S*asyajeevavaividhyam* (Plant Diversity) from *Bhagavatha*, Personal and Societal Health from *Astangahrudayam, Ayurveda* from ancient Sanskrit Literature, Chemistry from *Mahabharata*, *Yoga* from *Patanjala Yogadarshanam* which would not only help in their course of study but also allows them imbibe moral values and life skills.
- The semester also focuses on *Subhashitham*, which enables students learn certain proverbs which have hidden in depth meaning and explanation. Understanding these would improve the writing and public speaking skills of students.

Prescribed Textbook:

1. *Vijnanaprasoonam* - Published by Mangalore University Sanskrit Teachers Association

Reference books:

1. *Samskrutha Bhashashastra mattu Sahityacharitre* - Dr K. Krishnamurthy, Vidwan N. Ranganathasharma and Vidwan H. K. Siddagangayya.
2. *Shrimadbhagavatapuranam* - Bharata Darshana Prakashana.
3. *Shrimanmahabharatha* - Bharata Darshana Prakashana.
4. *Pantanjala Yogashastram* - Swami Adidevananda.
5. *Ashtangahrudayam* - Vagbhatacharya.
6. *Vaidyakeeyasubhashitasahityam* - Dr. B. G. Ghanekar.
7. *Sandarbhasooktihi* - Vidwan Ranganathasharma.

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
SEMESTER SCHEME 2022-23 ONWARDS

III Semester: BBA		
Sanskrit Language Paper-3 Title – Drama and Dramaturgy Maximum Marks: 100		
1	Unit 1: Introduction to Sanskrit Drama and Dramaturgy Origin and development of Sanskrit Drama - *Dasarupakas* and their *Lakshana*, Important Dramas and Dramatists in Sanskrit Literature. - 6 Hours.	20
2	Unit 2: *Madyamavyayoga* - 15 Hours. *Nagananda* - 5th Act - 15 Hours. *Alankara* - *Upama, Roopakam, Utpreksha, Arthantarnyasaha, Anuprasaha, Yamakam* - 6 Hours. *Chandas* - *Anushtup, Indravajra, Upendravajra, Vasantatilaka, Malini, Mandakranta* - 6 Hours.	60
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Padya*	2 out of 4	2X6=12
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 4	2X6=12
5	Short notes (To be answered in Sanskrit only)	2 out of 4	5X2=10
6	*Alankara*	1 out of 3	1X5=05
7	*Chandas*	1 out of 3	1X5=05
8	Grammer	5 out of 8	5X1=05
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with popular Classical Dramas in Sanskrit literature.
- The course also teaches in detail the origin, development and *Lakshanas* of Sanskrit Drama, which gives in depth knowledge on Sanskrit Literature.
- Sanskrit Dramas not only reflect prose and poetic excellence but also depicts contemporary society and highlights human values, which helps the students.
- The students also learn the theoretical aspects related to the production of the play. The concepts like *Rasa, Bhava, Abhinaya* are blended into the teaching learning of the play.
- The semester also focuses on *Chandassu* and *Alankara,* which enables students learn to compose *Shlokas* and recite them.

Prescribed Textbook:

1. *Natakamouktikam* - Published by Mangalore University Sanskrit Teachers Association.

Reference books:

1.	*Bhasanatakachakram*	- Vyakhyana by Acharya Baladevananda Upadhyaya, Choukhamba Samskrit Series, Varanasi.
2.	*Shree vishvanatha kavirajapraneetaha Sahityadarpanaha*	- Vyakhyana by Krishnamohanashastri Choukhamba Samskrit Samsthanam, Varanasi.
3.	*Samskruthanataka*	- Prof. A. R. Krishnashastri.
4.	*Bhasakavi*	- Prof. A. R. Krishnashastri.
5.	*Mahakavi Sriharshapraneetam Naganandam*	- Vyakhyana by Pandit Ramanatha Tripathi Shastri, Choukhamba Krishnadas Academy, Varanasi.
6.	*Bhasamahasamputa*	- Dr. S. V. Parameshwara Bhatta.
7.	*Harshanatakasamputa*	- Dr. S. V. Parameshwara Bhatta.
8.	*Dasharoopakam*	- Dhananjaya

IV Semester: BBA

Sanskrit Language Paper-4
Title – *Samskrute Vanijyam*

Maximum Marks: 100

1	*Samskrute Vanijyam* 1. *Samskrute Vanijyam* - 6 Hours. 2. *Pracheenam Rajyashastram* - 7 Hours. 3. *Koutileeya Arthapaddatihi* - 7 Hours. 4. *Mahabharate Nirvaha Paddatihi* - 8 Hours. 5. *Puranalokasya Balakou* - 6 Hours. 6. *Nyavadi Bidalaha* - 4 Hours. 7. *Patralekhanam* - 6 Hours. 8. *Loukika Nyayaha* - 4 Hours.	80
2	Internal Assessment Tests, Seminars, Assignments	20
3	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Explanation of a given quotes	5 out of 8	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 3	2X6=12
5	Letter Writing	1 out of 2	1X8=08
6	Explanation of *Nyayas*	2 out of 4	2X4=08
7	Match the following	5 out of 6	5X1=05
8	Grammer	6 out of 8	6X1=06
			Total Marks - 80

P.T.O.

Learning Outcomes:

- This course aims to acquaint the students with Sanskrit miscellaneous texts.
- The miscellaneous Sanskrit literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values, which would help students in their daily lives.
- The students in this semester are also introduced to specific texts in keeping with their course of study.
- The students of Commerce and Management will study the history of Management (*Vanijyashastra*) according to Sanskrit Literature, *Arthaneeti, Rajaneeti* from *Chanakyaneeti*, Taxation, *Raajaneeti, Adhikara Vikendrikarana* from *Mahabharata* would not only help in their course of study but also allows them imbibe moral values and life skills.
- Students are also introduced to the art of Letter Writing and Resume Writing in Sanskrit.
- The semester also focuses on *Nyayas*, which enables students learn certain proverbs which have hidden in depth meaning and explanation. Understanding these would improve the writing and public speaking skills of students.

Prescribed Textbook:

1. *Vanijyamouktikam* - Published by Mangalore University Sanskrit Teachers Association.

Reference books:

1. *Samskrutha Bhashashastra mattu Sahityacharitre* - Dr. K. Krishnamurthy, Vidwan N. Ranganathasharma and Vidwan H. K. Siddagangayya.
2. *Shrimanmahabharatha* - Bharata Darshana Prakashana.
3. *Chankya Neethi* - Mahabala Seethalabhavi.
4. Complete *Chanakya Neethi* - Vishwanatha Sharma and Igen
5. *Sandarbhasooktihi* - Vidwan Ranganathasharma
6. *Loukika Nyayakoshaha* - Dr. Pramod Ganesh Laale, translated to Sanskrit by Dr. Penna Madhusoodana.

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Board of Studies in Sanskrit
SYLLABUS FOR SANSKRIT LANGUAGE
UNDER GRADUATE COURSES
SEMESTER SCHEME 2025-26 ONWARDS

	III Semester: BCA	
	Sanskrit Language Paper-3 Title – Drama and Dramaturgy Maximum Marks: 100	
1	Unit 1: Introduction to Sanskrit Drama and Dramaturgy Origin and development of Sanskrit Drama - *Dasarupakas* and their *Lakshana,* Important Dramas and Dramatists in Sanskrit Literature. - 5 Hours.	20
2	Unit 2: *Malavikagnimitram* - 1st Act - 16 Hours. *Mrucchakatikam* - 1st Act - 16 Hours. *Alankara* - *Upama, Roopakam, Utpreksha, Arthantarnyasaha, Anuprasaha, Yamakam* - 6 Hours. *Chandas* - *Anushtup, Indravajra, Upendravajra, Vasantatilaka, Malini, Mandakranta* - 6 Hours.	60
3	Internal Assessment Tests, Seminars, Assignments	20
4	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
	Duration of Examination – 3 Hrs.		**Max. Marks - 80**
1	Translation and Explanation of *Padya*	2 out of 4	2X6=12
2	Reference to context	5 out of 7	5X3=15
3	Questions for Essay Type Answer	2 out of 4	2X8=16
4	Short Notes	2 out of 4	2X6=12
5	Short notes (To be answered in Sanskrit only)	2 out of 4	2X5=10
6	*Alankara*	1 out of 3	1X5=05
7	*Chandas*	1 out of 3	1X5=05
8	Grammer	5 out of 8	5X1=05
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with popular Classical Dramas in Sanskrit literature.
- The course also teaches in detail the origin, development and *Lakshanas* of Sanskrit Drama, which gives in depth knowledge on Sanskrit Literature.
- Sanskrit Dramas not only reflect prose and poetic excellence but also depicts contemporary society and highlights human values, which helps the students.
- The students also learn the theoretical aspects related to the production of the play. The concepts like *Rasa, Bhava, Abhinaya* are blended into the teaching learning of the play.
- The semester also focuses on *Chandas* and *Alankara*, which enables students learn to compose *Shlokas* and recite them.

Prescribed Textbook:

1. *Natakachandrika* - Published by Mangalore University Sanskrit Teachers Association.

Reference books:

1.	*Malavikagnimitram*	-	Vyakyana by Rama Narayana Acharya, Nirnaya Sagara Press, Mumbai.
2.	*Mrucchakatikam*	-	Vyakyana by Dr. Mahaprabhulal Goswami, Choukhamba Amarabharathi Prakashana, Varanasi.
3.	*Sahityasourabham*	-	Published by Prasaranga, Samskruta Vishvavidyanilaya, Bangalore.
4.	*Kalidasamahasamputa*	-	Dr. S.V. Parameshwara Bhat.
5.	*Malavikagnimitram*	-	Edited by Dr. K. Krishnamurthy, Published by Pathyapustaka Nirdeshanalaya, Karnataka Vishvavidyanilaya, Dharwad.
6.	*Kalidasa*	-	M. Lakshminarasimhayya, Published by Mysuru University.
7.	*Avemannina Aatadabandi*	-	Dr. Bannanje Govindacharya.
8.	*Shreevishvanatha Kavirajapraneetha Sahithyadarpana*	-	Vyakhyana by Krishnamohanashastri, Choukhamba Samskrit Samsthanam, Varanasi.
9.	*Samskritanataka*	-	Prof. A.R. Krishnashastri.
10.	*Dasharoopakam*	-	Dhananjaya

IV Semester: BCA

Sanskrit Language Paper-4
Title – *Samskrute Vijnanam*

Maximum Marks: 100

1	*Samskrute Vijnanam* 1. *Pracheena Bharateeya Vijnanam* - 6 Hours. 2. *Vrukshayurvedaha* - 6 Hours. 3. *Karmayogaha* - 7 Hours. 4. *Vichikitsa* - 4 Hours. 5. *Chittavruttinirodhaha* - 7 Hours. 6. *Dinacharyapradeepika* - 6 Hours. 7. *Loukika Nyayaha* - 4 Hours. 8. *Tambulasya Trayodashagunaaha* - 4 Hours. 9. *Nrupatunga Kathaa* - 4 Hours.	80
2	Internal Assessment Tests, Seminars, Assignments	20
3	**Teaching hours – 4 per week** Total Teaching Hours - 48 CREDITS – 3	

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1	Translation and Explanation of *Gadya*	2 out of 3	2X5=10
2	Explanation of a given quotes	5 out of 8	5X3=15
3	Questions for Essay Type Answer	1 out of 2	1X7=07
4	Short Notes	2 out of 4	2X5=10
5	Short notes (To be answered in Sanskrit only)	2 out of 4	2X5=10
6	Match the following	5 out of 6	54X1=05
7	Grammer	6 out of 8	6X1=06
			Total Marks - 80

Learning Outcomes:

- This course aims to acquaint the students with Sanskrit miscellaneous texts
- The miscellaneous Sanskrit literature which not only reflect poetic excellence but also depicts contemporary society and highlights human values, which would help students in their daily lives.
- The students in this semester are also introduced to specific texts in keeping with their course of study.
- The students of Science study Science, Maths, Physics, Atomic Science, Chemistry and Ayurveda as depicted in Ancient Sanskrit Literature, Yoga, *Manonigraha* from *Patanjala Yogadarshanam,* Personal and Societal Health from *Astangahrudayam, Karmayoga* from *Bhagavadgeeta,* which would not only help in their course of study but also allows them imbibe moral values and life skills.
- The semester also focuses on *Nyayas,* which enables students learn certain proverbs which have hidden in depth meaning and explanation. Understanding these would improve the writing and public speaking skills of students.

Prescribed Textbook:

1. *Vijnanachandrika* - Published by Mangalore University Sanskrit Teachers Association.

Reference books:

1. *Samskrutha Bhashashastra mattu Sahityacharitre* - Dr. K. Krishnamurthy, Vidwan N. Ranganathasharma and Vidwan H. K. Siddagangayya.
2. *Shrimanmahabharatha* - Bharata Darshana Prakashana.
3. *Pantanjala Yogashastram* - Swami Adidevananda.
4. *Ashtangahrudaya* - Vagbhatacharya.
5. *Shreemad Bhagavadgeetha* - Swamy Ramasukadas.
6. *Sandarbhasooktihi* - Vidwan Ranganathasharma.
7. *Loukika Nyayakoshaha* - Dr. Pramod Ganesh Laale, translated to Sanskrit by Dr. Penna Madhusoodana.

Chairperson BOS,
Mangalore University

MANGALORE UNIVERSITY

OPEN ELECTIVE

Three credits each

UNDER GRADUATE

BA/B.Sc/B.Com/BSW/BCA/BBA

Syllabus framed under State Education policy-2024

SYLLABUS

For the year 2025-2026 and onwards

Open electives for all UG Courses

III & IV SEMESTERS

BOARD OF STUDIES IN SANSKRIT
MANGALORE UNIVERSITY,
MANGALAGANGOTHRI – 574199.

MANGALORE UNIVERSITY
STATE EDUCATION POLICY 2024
Open Elective Courses in Sanskrit
III Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses
Title: *Samskrit Bhashadeepika tatha Kathasahitya*

Semester	Open Elective (OE) –OE- 1 (3) Credits	Marks	Credits
III	*Samskruta Bhashadeepika tatha Kathasahitya* 1. *Samskruta Bhashadeepika* 2. *Sanghe Shakthihi* 3. *Ouchityaprajna tatha Sanmitrata* 4. *Puranalokasya Balakou* 5. *Pratyutpanamatitvam*	80	3
	Internal Assessment Examination: Assignment, Test, Seminar	20	
	Total **Teaching hours - 3 per week** **Total Teaching Hours – 42**	100	3

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1.	Multiple choice question	20 out of 25	20x1=20
2.	Questions for Essay Type Answer	3 out of 5	3x8=24
3.	Question Formation	5 out of 8	5x1=05
4.	Match the Following	6 out of 6	6x1=06
5.	Fill in the blanks	5 out of 7	5x1=05
6.	Translation –From Sanskrit to Kannada / English	8 out of 10	8x1= 08
7.	Short Notes	3 out of 5	3X4 = 12
			Total Marks - 80

Learning Outcomes:

- This course aims to get the students acquainted with Sanskrit Language.
- Students who do not have any knowledge about Sanskrit would also be able to learn the language from scratch and understand.
- It intends to give an understanding of literature, through which students will be able to understand and interpret the Sanskrit Texts.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Language.

Books for study & Reference:

1. *Sanskruthabhashadeepika* - Shrisurasaraswati Sabha Sringeri.
2. *Panchathantram* - Vishnusharma.
3. *Upanishad Bhavadhare* - Sri Somanathananda.
4. *Vijnanaprasoonam* - Mangalore University Sanskrit Teachers' Association.
5. *Nirvahanasopanam* - Mangalore University Sanskrit Teachers' Association.

Open Elective Courses in Sanskrit

IV Semester – BA/B.Sc./B.Com/BSW/BCA/BBA and other UG Courses

Title: Ramayanam and Mahabharatam

Semester	Open Elective (OE) –OE-1 (3) Credits	Marks	Credits
IV	1. *Jatayu Prasanga* 2. *Vidhuraneeti* 3. *Gograhanam* 4. *Abhayam Te Pradasyami* 5. *Anushasana Parva*	80	3
	Internal Assessment Examination: Assignment, Test, Seminar	20	
	Total **Teaching hours – 3 per week** **Total Teaching Hours – 42**	100	3

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 80**
1.	Multiple choice question	20 out of 25	20x1=20
2.	Questions for Essay Type Answer	3 out of 5	3x8=24
3.	Question Formation	5 out of 8	5x1=05
4.	Match the Following	6 out of 6	6x1=06
5.	Fill in the blanks	5 out of 7	5x1=05
6.	Translation –From Sanskrit to Kannada / English	8 out of 10	8x1= 08
7.	Short Notes	3 out of 5	3X4 = 12
			Total Marks - 80

P.T.O.

Learning Outcomes:

- The course intends to enable students understand life style of the people in the Ancient Indian Literature.
- Students learn to imbibe healthy practices as described in these texts.
- The study of Indian Epics like *Ramayana* and *Mahabharatha* would enable students gain moral values and life values which can be incorporated into their daily lives.

Books for study & Reference:

1. *Shrimanmahabharatha* - Bharata Darshana Prakashana.
2. *Shrimadramayanam* - Vidwan Ranganatha Sharma.
3. *Shrimadramayanam* - Bharata Darshana Prakashana.
4. *Bharathasangrahaha* - Lakshmanasuri.
5. *Ramayanasangrahaha* - Lakshmanasuri.

MANGALORE UNIVERSITY

Sanskrit Optional Course

Five credits each

UNDER GRADUATE

BA

Syllabus framed under State Education policy-2024

SYLLABUS

For the year 2025-2026 and onwards

III to IV SEMESTERS

BOARD OF STUDIES IN
SANSKRIT MANGALORE
UNIVERSITY,

MANGALAGANGOTHRI - 574199

III SEMESTER B.A SANSKRIT OPTIONAL
PAPER – I

Syllabus	Marks	Hours
1. *Vyakarana Parichaya mattu Pravesha*	15	10
2. *Champu Kavya Parichaya* and *Champu Ramayana(Sundrakanda)*	45	26
3. *Tarka Sangraha (Poorva Bhaga)*	30	18
4. *Laghu Siddanta Koumudi (Ach Sandhi)*	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours – 6 per week Total Teaching Hours - 72 CREDITS – 5		

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.1	Word Form	2 out of 4	2X6 = 12
1.2	Write the Verb – *Atmanepadi*	1 out of 2	1X3 = 3
2.1	Main Question	1 out of 2	1X8 = 8
2.2	Main Question	1 out of 2	1X8 = 8
2.3	Translation of *Gadya*	2 out of 4	2X4 = 8
2.4	Reference to context	3 out of 5	3X3 = 9
2.5	Short notes (To be answered in Sanskrit only)	2 out of 4	2X4 = 8
2.6	Short notes	2 out of 4	2X6 = 12
3.1	Questions for Essay Type Answer	1 out of 2	1X6 = 6
3.2	Sentence Explanation	3 out of 5	3X3 = 9
3.3	Short notes (To be answered in Sanskrit only	2 out of 4	2X3 = 6
4.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
4.2	Explanation of Sutra	3 out of 5	3X5 = 15
4.3	Short notes	2 out of 4	2X4 = 8
	Total		Total Marks - 120

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Champu Kavya* and *Tarka Sangraha* is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Kannada Swayam Shikshak / Vyakarana,* Pravesha Bailooru Narayana Tantri, Chowkhamba Publication.
2. *Samskruta Saahitya Charitre* and *Champu Ramayanam.*
3. *Tarka Sangraha,* Peethika sahita Chowkhamba Press.
4. *Laghu Siddanta Koumudi.*

IV SEMESTER B.A SANSKRIT OPTIONAL
PAPER – I

Syllabus	Marks	Hours
1.*Vyakarana Parichaya mattu Pravesha*	15	10
2. *Padya Kavya Megha Sandesha (Poorva Bhaga)*	45	26
3. *Tarka Sangraha (Uttara Bhaga)*	30	18
4. *Laghu Siddanta Koumudi Hal Sandhi Visarga Sandhi*	30	18
Total	**120**	**72**
Internal Assessment Examination	30	
Total	**150**	
Teaching hours – 6 per week Total Teaching Hours - 72 CREDITS - 5		

Scheme of Examination			
Duration of Examination – 3 Hrs.			**Max. Marks - 120**
1.	Main Question	3 out of 5	3X5 = 15
2.1	Questions for Essay Type Answer	3 out of 5	3X8 = 24
2.2	Translation of Padya	2 out of 4	2X6 = 12
2.3	Reference to context	3 out of 5	3X3 = 9
2.4	Short notes	2 out of 4	2X5 = 10
3.1	Questions for Essay Type Answer	1 out of 2	1X8 = 8
3.2	Reference to context	4 out of 6	4X4 = 16
3.3	Short notes (To be answered in Sanskrit only	2 out of 4	2X5 = 10
4.1	Short notes	2 out of 5	2X4 = 10
4.4	Sandhi	6 out of 8	6X1 = 6
			Total Marks -120

Learning Outcomes:

- This course aims to get the students acquainted with Classical Sanskrit Literature.
- It intends to give an understanding of literature, through which students will be able to understand the poetic nuances and texts. They develop the ability to use language in a descriptive way.
- An excerpt from *Meghadutham* is introduced which enables the students study in depth about Sanskrit Literature.
- The study of Ancient Indian Literature would enable students gain moral values and life values which can be incorporated into their daily lives.
- The course also seeks to help the students negotiate the text independently with the help of proficiency in Sanskrit Grammar.

Reference books:

1. *Sanskrit Kannada Swayam Shikshak / Vyakarana,* Pravesha Bailooru Narayana Tantri, ChowkHamba Publication.
2. *Samskrit Saahitya Charitre*, Chowkamba Press, Ranganath Sharma.
3. *Tarka Sangraha*, Chowkhamba Press.
4. *Laghu Siddanta Koumudi*, Chowkhamba Press.

State Education Policy (SEP) 2024

Programme Outcomes (PO) of BCom Degree Programme

The Bachelor of Commerce (BCom) programme has the core objective of preparing employable and resourceful graduates. Keeping in mind the basic end result, the **programme outcomes** of BCom would be as follows:

a. To provide students with the knowledge, skills, attitudes and values that will help them take decisions for their lives.
b. Hands on tools to help them in the world of business and commerce with in depth awareness of the contents of different courses under the Programme.
c. Holistic development of the personality to understand and actively participate in the well-being of the society.
d. Work collaboratively and productively in teams. Critically evaluate new ideas, research findings, methodologies and theoretical framework in their chosen elective field.
e. Demonstrate leadership skills, become academically brilliant, inculcate research skills, urge to become global citizens and become constructive citizens of our country

Scheme of Teaching and Evaluation for BCom Programme

Semester I								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		Language – I	Lang	4	80	20	100	3
2		Language – II	Lang	4	80	20	100	3
3	BCom 1.1	Quantitative Techniques - I	Core	5	80	20	100	5
4	BCom 1.2	Foundation of Commerce – I (HR, Marketing & Finance)	Core	5	80	20	100	5
5	BCom 1.3	Financial Accounting – I	Core	5	80	20	100	5
6.	B.Com 1.4	Individual and Team Management / Fundamentals of Business Analytics	Optional	4	80	20	100	3
7		Constitution/Values	Compulsory	2				2
Sub –Total				29				26

Semester II

Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1		Language – I	Lang	4	80	20	100	3
2		Language – II	Lang	4	80	20	100	3
3	BCom 2.1	Quantitative Techniques - II	Core	5	80	20	100	5
4	BCom 2.2	Foundation of Commerce – II (Insurance, Banking & Finance)	Core	5	80	20	100	5
5	BCom 2.3	Financial Accounting – II	Core	5	80	20	100	5
6.	B.Com 2.4	Fundamentals of Organisational Behaviour/Strategic Management	Optional	4	80	20	100	3
		Constitution/Values	Compulsory	2				2
Sub –Total				29				23

Semester III

Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1		Language – I	Lang	4	80	20	100	3
2		Language – II	Lang	4	80	20	100	3
3	BCom 3.1	Cost & Management Accounting – I	Core	5	80	20	100	5
4	BCom 3.2	Corporate Accounting – I	Core	5	80	20	100	5
5	BCom 3.3	Direct Tax – I	Core	5	80	20	100	5
6	B.Com 3.4	HR/ Marketing/ Finance/ Accounting/ Analytics	Elective1	3	80	20	100	2
7	B.Com 3.5	Digital Marketing	Compulsory	3	80	20	100	2
Sub –Total				29				25

Semester IV

Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1		Language – I	Lang	4	80	20	100	3
2		Language – II	Lang	4	80	20	100	3
3	BCom 4.1	Cost & Management Accounting – II	Core	5	80	20	100	5
4	BCom 4.2	Corporate Accounting – II	Core	5	80	20	100	5
5	BCom 4.3	Direct Tax – II	Core	5	80	20	100	5
6	B.Com 4.4	HR/ Marketing/ Finance/ Accounting/ Analytics	Elective 2	3	80	20	100	2
7	B.Com 4.5	Personal Invt Mgt/Real Estate Mgt /Logistics/ Travel & Tourism	Skill Enhancement	3	80	20	100	2
Sub –Total				29				25

Semester V								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1	BCom 5.1	Financial Management – I	Core	6	80	20	100	5
2	BCom 5.2	Cost & Management Accounting – III	Core	6	80	20	100	5
3	BCom 5.3	Direct Tax – III	Core	6	80	20	100	5
4	B.Com 5.4	Business Law	Core	4	80	20	100	3
5	B.Com 5.5	Auditing & Assurance	Core	4	80	20	100	3
6	B.Com 5.6	Professional Communication/ Entrepreneurial Skills/Life Skills/Ecommerce/ Internship	Skill Enhancement	3	80	20	100	2
Sub –Total				29				23

Semester VI								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1	BCom 6.1	Financial Management – II	Core	6	80	20	100	5
2	BCom 6.2	Cost & Management Accounting – IV	Core	6	80	20	100	5
3	BCom 6.3	GST & Customs Duty	Core	6	80	20	100	5
4	B.Com 6.4	Corporate Law	Core	4	80	20	100	3
5	B.Com 6.5	Employability Skills	Core	4	80	20	100	3
6	B.Com 6.6	Research Methodology	Skill Enhancement	3	80	20	100	2
Sub –Total				29				23

I Semester BCom:

Course content:

1.1: Quantitative Techniques – I
1.2: Foundation of Commerce – I (HR, Marketing & Finance)
1.3: Financial Accounting – I
1.4: Individual and Team Management

or

Fundamentals of Business Analytics

QUANTITATIVE TECHNIQUES-I

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Study concerning metrics of dispersion, mean, median, and mode.
2. Connect a formal quantitative approach to problem solving and decision-making.
3. Utilize the idea of index numbers to comprehend current market conditions
4. Compute the ratios, proportions, discounts, and percentages that are utilized in business.

COURSE CONTENTS:

Module	Particulars	No of hrs
Module 1	**Introduction and Basic Concepts** Introduction to Statistics: Meaning and Definitions (Singular and Plural), Types of Data and Variables, Measures of Central Tendency-Arithmetic Mean-Properties (Combined Mean Included), Median and Mode.	**12**
Module 2	**Descriptive Statistics of Univariate Distribution** Measures of dispersion, Absolute and Relative Measures, Types-Range, Quartile deviation, Mean deviation, Standard Deviation. Coefficient of Variation and Variance	**12**
Module 3	**Index Numbers** Meaning and Uses of Index Numbers, Steps in the Construction of Index Numbers, Construction of Index Numbers: Simple and Weighted Average of Price Relatives, Weighted Aggregative Method: Laspeyres's, Paasche's, and Fisher's Index Numbers Tests of consistency of index number, time reversal, and factor reversal. Consumer Price Index Number: Aggregative Expenditure Method and Family Budget Method.	**12**
Module 4	**Number System and Indices** Introduction- Natural Numbers, Whole Numbers, Integers-Prime numbers -Rational and Irrational Numbers (simple Problems on sum of Natural numbers…….) Real Number- HCF and LCM calculations. Indices and Laws of Indices: Problems	**12**
Module 5	**Commercial Arithmetic** Concept of Percentages- problems on Profit/Loss,, Simple Interest, Compound Interest, Nominal and Effective Rate of Interest, Cash Discount and Trade Discount.	**12**

Skill Development Activities

1. Visit the college office and collect data regarding student strength, results, etc. and analyze the same using statistical techniques.
2. Visit any Commercial Bank in your area and collect the information about types of loans and the rates of interest on loans
3. Use consumer price data to create and interpret index values in order to analyze inflation and economic trends.
4. Any other Activities which are relevant to the course

Books for Reference:

1. Business Statistics- S.C. Gupta
2. Business Mathematics- D.C. Sanchete & V.K. Kapoor, Sulthan Chand and sons
3. Business Statistics- S.P. Gupta, S.E. Gupta, B.N. Gupta
4. Business Mathematics-Madappa and Sridhara Rao, Shubhash Publications
5. Business Mathematics, S. N Doraira, United Publication
6. Financial Mathematics, A Lenin Jyothi, Himalaya Publications,Mumbai
7. Business Statistics & Mathematics, Vittal
8. Business Mathematics – S.P Gupta
9. Business Mathematics – Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain, Himalaya Publications
10. Business Mathematics – Kashyap Trivedi, Chirag Trivedi, Pearson Publications
11. Comprehensive Statistical Methods – P.N. Arora, Sumeet Arora & S.Arora, Chand Publications

Foundation of Commerce – I
(HR, Marketing and Finance)

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Create awareness of how HR works in organization and its role and functions.
2. Understand the basic concepts of Marketing, Marketing Management and Market Segmentation
3. Understand the basic concepts of Financial Management and the decisions involved in finance

COURSE CONTENTS:

Module	Particulars	No of Hrs
Module 1	**Introduction to Human Resource Management** Introduction, concept and meaning of Human Resource, Human Resource Management –Meaning - Characteristics, Objectives and scope, Significance of HRM, Personnel Management V/s. HRM, Paradigm shift in HRM, Significance of HRM, Human Resource Manager –Qualities of HR manager - changing role of HR manager, Human Resource Information System – Benefits of HRIS.	**12**
Module 2	**Dimensions of Human Resource Management** Human Resource Planning – meaning, characteristics and importance, Job Analysis – meaning and objectives, Recruitment and Selection –meaning, features and objectives, Training and Development – meaning, features and importance, Leadership - meaning, objectives and importance, Communication - meaning, objective and importance, Motivation - meaning, objectives and importance.	**12**
Module 3	**Introduction to Marketing** Introduction, Meaning and Definition of Market, Marketing, Nature/ Features of Marketing , Scope of Marketing/ Marketing Entities, Importance of Marketing, Core Concepts of Marketing , Approaches to the study of Marketing, Marketing Philosophies, Marketing Management – Meaning, features, importance	**12**
Module 4	**Market Segmentation** Meaning and Definition, Need, Criteria of Effective Segmentation, Bases, Target Market Selection-Positioning Concept (STP Model) –Importance, Product Differentiation vs. Market Segmentation. Marketing Mix- Meaning, Elements (4 Ps/ 7 Ps/ 4 Cs)	**12**

Module 5	**Fundamentals of Financial Management** Meaning of Business Finance – Meaning and definition of Financial Management - Objectives of Financial management: Profit maximization and wealth maximization –Financial Decisions: Financing decision, Investment decisions and Dividend decisions – Organisation of Structure of Finance Department - Functions of a Finance Manager	**12**

Skill Development Activities:

1. Visit the nearby industry or startup and evaluate the hiring process and make study on relevance of human resource in the organisation.
2. Analyze the marketing environment of your locality and identify need, wants & purchasing power of customers.
3. Students can collect and present the organization chart of Finance Section of any business firm.

Books for Reference:

1. Human Resource Management by P.Subba Rao, Himalaya Publishing house, Mumbai.
2. Personnel management by P.Subba Rao, Himalaya Publishing house, Mumbai.
3. Human Resource Management by K Ashwathappa, Mc Graw Hill Publication
4. Human Resource Management by Suman Shetty N and Ravi M.N., Professional Publishers, Hyderabad.
5. Philip Kotler (2015), Principles of Marketing. 13th edition.Pearson Education.
6. Saxena Rajan, (2017) Marketing Management, Tata McGraw-Hill Publishing Company Ltd., New Delhi. Fifth Edition.
7. Kumar Arun & MeenakshiN (2016), Marketing Management, Vikas Publishing House Pvt. Ltd., New Delhi. Third Edition
8. Panda Tapan (2008), Marketing Management, Excel books, New Delhi, Second Edition.
9. Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. Marketing: Concepts and Cases. (Special Indian Edition)., McGraw Hill Education
10. William D. Perreault, and McCarthy, E. Jerome., Basic Marketing. Pearson Education.
11. Chhabra, T.N., and S. K. Grover. Marketing Management.Fourth Edition. Note: Latest edition of text books may be used.
12. Financial Management: Text, Problems and Cases" by M.Y. Khan and P.K. Jain.
13. Financial Management: I.M.Pandey
14. Financial Management Theory and Practice: ShashiK.Gupta and R.K.Sharma
15. Financial Management: Ravi M Kishore.

Financial Accounting - I

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Understand the need of maintaining proper books of records of financial nature for an organisation.
2. Prepare financial statements of a sole trader to assess the financial position and results.
3. Understand the meaning and financial records of a non-trading concerns.

COURSE CONTENTS:

Module	Particulars	No of Hrs
Module 1	**Introduction to Accounting:** Meaning of Accounting – Basic Terms in Accounting – Entity, Business Transaction, Capital, Drawings, Assets, Liability, Debtor, Creditor, Stock, Purchases and Sales. Accounting Concepts – Meaning – Types (Business Entity, Money Measurement, Going Concern, Accounting Period, Cost, Dual Aspect, Revenue Recognition, Matching, Accrual, Objective Evidence) Accounting Conventions – Conservatism, Consistency, Full Disclosure and Materiality. Basis of Accounting – Cash & Accrual, Systems of Accounting – Single & Double Entry. Rules of Debit & Credit as per American Approach - Accounting Equation Accounting Cycle – Journal, Ledger & Trial Balance	**12**
Module 2	**Depreciation Accounting:** Meaning of depreciation and amortisation, Causes, Factors determining economic life of the asset – Methods of charging depreciation Accounting treatment for charging depreciation under Straight Line Method & Written Down Value Method - Change in Method of Depreciation	**12**
Module 3	**Final Accounts of Sole Trading Concerns:** Preparation of Trading & Profit & Loss Account and Balance Sheet of a Sole Trader. Adjustments – Closing Stock, Outstanding & Prepaid Expenses, Accrued Incomes & Incomes Received in Advance, Bad Debts & Provisions for Doubtful Debts, Provision for discount on Debtors, Depreciation, Interest on Capital & Drawings, Manager's Commission, Goods Sent on Sale or Return basis, Treatment of deferred revenue expenditure.	**12**
Module 4	**Final Accounts of Not for Profit Organisations:** Meaning & Characteristics of Non- Profit Organisations Meaning of Capital & Revenue Income & Expenditure – Deferred Revenue Expenditure Meaning of Receipts & Payment Account, Income & Expenditure Account and	**12**

	Balance Sheet. Differences between Income & Expenditure Account and Receipt and Payments Account. Preparation of Income & Expenditure and Balance Sheet when Receipts & Payment Account is given with adjustments for existing and new organisations.	
Module 5	**Bank Reconciliation Statement:** Meaning & Reasons for difference between Cash book and Pass book Balance Problems on preparation of BRS (problems when cash book and pass extract is given to be included)	**12**

Skill Development:

1. Visit minimum three Sole Trading Concern and examine its accounting practices.
2. Identify a non-trading concern and assist them in preparing its financial statements.
3. Apply deprecation methods to real life scenarios.
   Develop numerical, analytical and decision-making abilities

Books for Reference:

1. ICAI Study Materials on Principles & Practice of Accounting, Accounting and Advanced Accounting
2. SP Iyengar, Advanced Accounting, Sultan Chand & Sons, Vol. 1
3. Advanced Accounting Shukla M.C., Grewal T.S., S Chand, Vol. 1
4. Advanced Accounting, Gupta R.L., Sultan Chand & Sons, Vol. 1
5. Advanced Accounting Jain & Narang, Kalyani Publishers, Vol. 1
6. S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
7. B.S. Raman, Financial Accounting Vol. I & II, United Publishers & Distributors.

Note: Latest edition of text books may be used.

Individual and Team Management

4 Hours per week **48 Hours**

COURSE OUTCOMES:

After studying this course the students can

1. Become effective in their day to day transactions.
2. Develop interpersonal skills
3. Enhance individual resourcefulness in all walks of life and thereby improve the quality of their thinking and become self-motivated in their personal dealings.

COURSE CONTENTS:

Module	Particulars	No of hrs
Module 1	**Managerial Effectiveness and Inter-Personal Skills:** Meaning of Managerial Effectiveness, Essentials for Managerial Effectiveness and Importance of ME for an organization. Meaning of Inter- personal skills – Importance, Essentials IP skills – communication, clarity, empathy, etc., developing IP Skills – Assertiveness, Responsibility, Managing conflicts & factors hampering IP Skills, self-development goals & its relevance in the present time	12
Module 2	**Stress & Time Management:** Meaning of Stress, Sources of stress – Internal, external and types, Effects of stress & burnout – effect on environment and personal life. Strategies for coping with Stress – Avoiding and fighting stress, maintaining Work life balance – its importance and benefits. Importance of Time Management, Analysis of Time – time logs, Time wasters & time Abusers, Planning Time and Resources – Need & strategies for planning time – Matrix of Time Management, Setting Goals and objectives – Advantages and setting SMART goals and planning to achieve goals – Scheduling, Delegating and controlling time-wasters.	12
Module 3	**Creativity & Emotional Intelligence in Management:** Meaning of Creativity & Innovation, Stage of Creativity, Importance of Creativity, Barriers to Creative thinking, Developing Creativity and techniques of enhancing creativity – Brainstorming, Six Thinking Hats & Mind Mapping. Nature of Emotional Intelligence (EI), Definition of emotions – empathy, fear, anger and depression, Components of Emotional	12

	Intelligence, analysing the importance of emotions in the workplace – Negative and Positive emotions and Characteristic features of people with High IQ or High EQ.	
Module 4	**Working in Teams:** Meaning of Team & Team work, Importance of teamwork, Challenges of working in a Team, Characteristics of a successful team, Team dynamics vs Group dynamics, Employee engagement, 5C's & 4P's of Team building, Collaboration – meaning, benefits and tips to improve workplace collaboration.	12

Skill development:

1. Collecting the list of Best practices of enhancing managerial effectiveness of a few corporates.
2. Analysing the different techniques used by corporates in promoting work life balance amongst its employees.
3. Preparing a Time log of 24 hours for every student and providing feedback as to its improvement for better productivity
4. Application of Creativity techniques in a learners day to day social transactions
5. Team building games can be conducted on specific characteristics of a successful Team.

Books & Materials for Reference: (Text Books and Websites for additional reading)

1. The Effective Executive: Peter Drucker – Harper Collins
2. Workplace Stress – Concepts and Cases: Gopal V V – ICFAI University Press
3. Managing Time: David Fontana – BPS Books, New Delhi
4. The Seven Habits of Highly Effective People: Stephen R Covey – Simon & Schuster
5. The On-time, On Target Manager: Ken Blanchard and Steve Gottry – Harper Collins
6. Getting Things Done – The Art of Stress Free Productivity: David Allen – Penguin Books
7. Lifelong Creativity – An Unending Quest: Pradip N Khandwalla, Tata McGraw Hill.
8. Emotional Intelligence: Why It Can Matter More Than IQ: Daniel Goleman, Bantam Books.
9. How to Win Friends and Influence People: Dale Carnegie – Simon & Schuster
10. https://www.sessionlab.com/blog/team-building-activities/
11. https://asana.com/resources/team-building-games
12. https://teambuildinghub.com/team-building/activities-games/quick-team-building/
13. https://teambuilding.com/blog/team-building-games

Fundamentals of Business Analytics

4 Hours per week **48 Hours**

COURSE OUTCOMES:

After studying this course the students should be able to,

1. Understand analytical applications in practice.
2. Validate sources of data, use statistical resources and apply tools and techniques learnt to solve real time problems.
3. Formulate and manipulate business models, using quantitative methods including spreadsheets and graphical methods, in order to find solutions to real time problems.
4. Become aware about the emerging trends in the world of analytics

COURSE CONTENTS:

Module	Particulars	No of hrs
Module 1	**Introduction to Business Analytics:** Data, Types of Data- Forms of Data-Evolution of Big Data-Business Analytics -Need for Analytics - Types of Analytics-Importance of Business Analytics in Decision Making- Analytics Process Model-SMART model-Spreadsheet analysis-Internet of Things.	**7**
Module 2	**Technology of Big Data:** Overview of DBMS, Data Warehousing: Concepts, Need, Objectives– Relevance of Data Warehousing in Business Analytics-Data Mining-Application of Data Mining- Data Mining Technique- Data Classification- Hadoop Distributed File System-Features of HDFS- MapReduce-Features of MapReduce.	**12**
Module 3	**Data Scientists and Data Visualization:** Data Scientists-New Era of Data Scientists -Data Scientist model-Sources of Data scientists- Horizontal Versus Vertical Data Scientists- Retention of Data Scientists- Data Visualization-Types of Data Visualization -Issues in Data Visualization-Tools in data visualization- Data Collection, Sampling and Pre-processing-Types of Data Sources- Sampling-Types of Data Elements-Visual Data Exploration and Exploratory Statistical Analysis-Missing Values-Missing Values- Standardizing Data-Categorization-Weights of Evidence Coding-Variable Selection-Segmentation	**12**
	Practices of Analytics and Emerging Trends in Big Data: Predictive Analytics- Target Definition-Linear Regression - Logistic Regression -Decision Trees - Neural Networks -Support	

Module 4	Vector Machines-Ensemble Methods -Multiclass Classification Techniques -Evaluating Predictive Models-Descriptive Analytics-Association Rules -Sequence Rules –Segmentation-Survival Analysis- Survival Analysis Measurements-Kaplan Meier Analysis- Parametric Survival Analysis-Proportional Hazards Regression-Extensions of Survival Analysis Models-Evaluating Survival Analysis Models-Social Network Analytics-Social Network Definitions-Social Network Metrics-Social Network Learning-Relational Neighbor Classifier- Probabilistic Relational Neighbor Classifier -Relational Logistic Regression-Collective Inferencing – Egonets- Mobile Analytics- Practices of analytics in - Google-General Electric-Microsoft- Kaggle- Facebook-Amazon. Data for Big Data-Enterprise orientation for Big data –leadership – Targets-Analysts- Other Factors to Consider in Big Data Success-Emerging Technologies in Health Information Systems: Transforming Health in Information Era-Omics Revolution and Personalized Medicine-Genomic Data Integration into Medical Records-Socio- demographic Data for Health Records-Family Health History-Genomics Driven Wellness Tracking and Management System (GO-WELL)- Emerging trends of analytics in Education, Government, Finance & Supply Chain Management.	**17**

Skill development:

Course teacher can identify and give the skill development activities.

Books & Materials for Reference:

1. Big Data Black Book, DT Editorial Services, Dreamtech Press, 2015.
2. Big Data at Work, Thomas H. Davenport, Harvard Business Review Press, Boston, Massachusetts, 2014.
3. Analytics in a Big Data World, John Wiley & Sons, Inc., Hoboken, New Jersey,2014.
4. Big Data and Internet of Things: A Roadmap for smart Environments, Nik Bessis Ciprian Dobre Editors, Springer International Publishing Switzerland 2014.

II Semester BCom:

Course content:

1.1: Quantitative Techniques – II

1.2: Foundation of Commerce – II (Insurance, Banking & Finance)

1.3: Financial Accounting – II

1.4: Fundamentals of Organisational Behaviour

or

Strategic Management

QUANTITATIVE TECHNIQUES – II

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Establish relationships between variables in real-world situations by using methods like regression and correlation.
2. Use the ideas from probability distributions to solve practical issues.
3. Predict future results using time series
4. Recognise the relationship between two variables and how to use ratios and proportions to express it.

COURSE CONTENTS:

Module	Particulars	No of hrs
Module 1	**Descriptive Analysis of Bivariate Data:** Correlation- Meaning and Definition, Linear and Non-linear correlation, Correlation and causation, Scatter Diagram, Karl Pearson's Co-efficient of Correlation, Calculation and Spearman's Rank Correlation.	**12**
Module 2	**Regression Analysis:** Regression Analysis- Principle of Least Squares and Regression lines, Regression equations and estimation. Properties of Regression Coefficients.	**12**
Module 3	**Time Series Analysis md Theory of Probability:** Meaning and uses of Time Series, Various components of Time series, determination of Trend using Moving Average and Least square method Theory of Probability: Some important concepts, Addition Theorem of probability for two non-mutually and mutually exclusive events - Multiplication theorem of probability for dependent and independent events. Simple problems	**12**
Module 4	**Ratios and Proportions and Theory of Equations:** Definition- Equality of Ratio- Simple Problems. Proportion- definition- Direct Proportion-Inverse Proportion- Continued Proportion- Problems on proportions Equations: Definition - Degree of Equation. Types of Equation - Linear equations and its solution-Simultaneous linear equations-Quadratic equation-Solution by method of factorisation and formula method.	**12**
Module 5	**Permutation and Combinations:** Factorial Notations- permutations of n different things-Circular permutations-Permutation of things not all different- Restricted Permutation-Simple problems. Combinations - Simple problems based on formula.	**12**

Skill Development Activities

1. Determine the strength and direction of the relationship between advertisement expenditure and sales income by computing the correlation coefficient.
2. Use historical sales data to create a simple linear regression model to predict future sales based on advertisement expenditure.
3. Utilize a time series model to analyze monthly sales data to identify trends and seasonal patterns and generate a forecast for the upcoming year.
4. Instruct the students to use their knowledge of ratios to determine how much of each ingredient they would require to make the recipe for exactly the number of people in the group
5. The task involves resolving a shelf arrangement issue to maximize visibility by utilizing permutations and combinations to explore various arrangements

Books for Reference:

1. Business Statistics- S.C. Gupta
2. Business Mathematics- D.C. Sanchete & V.K. Kapoor, Sulthan Chand and sons
3. Business Statistics- S.P. Gupta, S.E. Gupta, B.N. Gupta
4. Business Mathematics-Madappa and Sridhara Rao, Shubhash Publications
5. Business Mathematics, S. N Dorairaj, United Publication
6. Financial Mathematics, A Lenin Jyothi, Himalaya Publications, Mumbai
7. Business Mathematics – S.P Gupta
8. Business Mathematics – Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain, Himalaya Publications
9. Business Mathematics – Kashyap Trivedi, Chirag Trivedi, Pearson Publications
10. Comprehensive Statistical Methods – P.N. Arora, Sumeet Arora & S.Arora, Chand Publications

Foundation of Commerce – II
(Insurance, Banking and Finance)

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Understand the concepts of Insurance, Banking and Finance.
2. Apply Fundamental conceptual knowledge to analyse and interpret relevant areas in Insurance, Banking and Finance.
3. Learn new reforms and technology in Insurance and Banking sector.
4. Evaluate the investment opportunities using risk and return

COURSE CONTENTS:

Module	Particulars	No of Hrs
Module 1	**Basics of Insurance:** Concept of Risk, Assurance and Insurance – Meaning – Definition – Functions – Need and Importance, Principles of Insurance Contract – Insurance Industry in India – IRDAI- Insurance Sector reforms – Bankassurance. Claims management – Claim settlement – legal frame- work –Third Party Administration.	**12**
Module 2	**Types of Insurance**: Life Insurance – Features – Principles – Life Issuance Products – Policy Conditions – Application and Acceptance – Assignment – Nomination – Surrender – Re-Insurance in life Insurance. Marine Insurance – Features – Policy Conditions – Clauses and covers. Fire Insurance – Motor vehicle Insurance. Health Insurance – Clauses – Health Insurance Frauds – Personal accident Insurance – Group Insurance.	**12**
Module 3	**Basics of Banking:** Origin – Evolution of banking – Definition of term bank and banking –Commercial Banks. Functions – Primary and subsidiary functions. Co-operative Banking – Primary – Central and State Co-operatives. Banks – Functions and Features. Principles of Investment Policy-Basic and allied principles. Financial Inclusion-Meaning, need and Importance. Cheques - Meaning and definition - features - Types and Crossing of Cheques. Paying Banker and Collecting Banker (Meaning only) Dishonour of Cheques-Reasons for Dishonour.	**12**
Module 4	**Innovative and Digital Banking:** ATM – Debit Cards – Credit Cards – Smart Cards – Internet Banking	**12**

	– Mobile Banking – Wallet Banking – Digital Cash – Core Banking System – NEFT – RTGS – IFSC – UPI – IMPS – AEPS - CIBIL- CTS – ECS – MICR.	
Module 5	**Basic Financial concepts:** Introduction to Risk & Return: Meaning of Risk and Return, Measurement of return- Return on Investment, Types of Risk- systematic & unsystematic risk, Risk analysis - Expected return, Standard deviation and Coefficient of Variation. Risk -Return trade off.	**12**

Skill development activities:

1. Learners should collect data from the company reports and analyse the risk and return
2. Learners can enhance knowledge by collecting Banking product details by visiting the bank.
3. Learners can understand Risk assessment, policy analysis and interpretations by taking a print of any insurance policy.
4. Learners can have ideas on technology usage in banking by using their mobile.

Reference Books:

1. Principles and practice of Life Insurance – P Perya Swamy.
2. Insurance Principles and Practice – Mishra M N.
3. Insurance and Risk Management – P K Gupta.
4. A Text Book on principles and Practice of life Insurance – G Krishna Swamy.
5. Financial Management: Text, Problems and Cases" by M.Y. Khan and P.K. Jain.
6. Indian Banking by R Parmeshwaram.
7. Banking Theory and Practice by P N Varshney.
8. Banking Theory, Law and Practice by KPM Sundharam and P N Varshney.
9. Principles and Practice of Banks by Indian Institute of Banking and Finance.
10. Digital Banking by Indian Institute of Banking and Finance.

Financial Accounting - II

5 Hours per week **60 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Learn about Accounting Standards and Indian Accounting standards.
2. Understand the recent developments in the field of financial accounting.
3. Learn to deal with special transactions and situations while preparing financial statements.

COURSE CONTENTS:

Module	Particulars	No of Hrs
Module 1	**Accounting Standards and Recent Developments in Accounting:** Accounting Standards - Meaning, Procedure to issue – Applicability Indian Accounting Standards – Meaning – Applicability Recent Trends in Accounting – Computerised Accounting - Big data Analytics, Cloud Computing in Accounting, Accounting with drones.	**12**
Module 2	**Conversion of Single Entry into Double Entry System:** Introduction – Meaning – Limitation of Single-Entry System – Differences between Single Entry & Double Entry System Problems on Conversion of Single Entry into Double Entry (preparing Opening Statement of Affairs, Cash Book, Total Debtors Account, Total Creditors Account, Trading & Profit & Loss Account and Balance Sheet).	**12**
Module 3	**Hire Purchase Accounting:** Introduction, Meaning of Hire Purchase, Features Terms used – Hire Purchaser, Hire Vendor, Cash Price, Hire Purchase Price, Total Interest, Down Payment & Net Cash Price Accounting for Hire Purchase transactions in the books of Hire Purchaser (when Cash Price and Rate of Interest is given) under Accrual System only. Repossession – Complete & Partial	**12**
Module 4	**Departmental Accounts:** Meaning, Types of Departments, Advantages, Basis of Allocation of common expenses and income among various departments Departmental Accounts – Columnar Trading & Profit & Loss Account, General Profit & Loss Account and Consolidated Balance Sheet Treatment of Inter Departmental Transfers at Cost and Selling Price.	**12**
Module 5	**Royalty Accounts:** Meaning – Types of Royalty. Terminologies – Lessor, Lessor, Minimum Rent, Short working – Recoupment of Short working. Accounting Treatment in the books of Lessee with opening Minimum Rent Account.	**12**

Skill Development:

1. Collect a copy of Hire Purchase agreement and examine the various terminologies.
2. Identify a business where royalty accounting is applied.
3. Learn to prepare financial statement with incomplete records using imaginary figure.
4. Know the differences between Accounting Standards and Indian Accounting Standards.

Books for Reference:

1. ICAI Study Materials on Principles & Practice of Accounting, Accounting and Advanced Accounting.
2. SP Iyengar, Advanced Accounting, Sultan Chand & Sons, Vol. 1
3. Advanced Accounting Shukla M.C., Grewal T.S., S Chand, Vol. 1
4. Advanced Accounting, Gupta R.L., Sultan Chand & Sons, Vol. 1
5. Advanced Accounting Jain & Narang, Kalyani Publishers, Vol. 1
6. S.N. Maheshwari, and. S. K. Maheshwari. Financial Accounting. Vikas Publishing House, New Delhi.
7. B.S. Raman, Financial Accounting Vol. I & II, United Publishers & Distributors.

Note: Latest edition of text books may be used.

Fundamentals of Organisation Behaviour

4 Hours per week **48 Hours**

COURSE OUTCOMES:

After completing the course, the student will be able to

1. Create awareness about how organizational behaviour works in an organization and its role and functions.
2. Develop insight with different theories of motivations and strategies to improve motivation in the workplace.
3. Understand group dynamics and demonstrate skills required for working in groups and team building
4. Understand the concepts of Personality and attitude, Perception and motivation,

COURSE CONTENTS:

Module	Particulars	No of Hrs
Module 1	**Introduction to Organisational Behaviour:** Meaning of Organizations –Importance of organizations- contributing disciplines to the Organizational Behavior- definitions and meaning of Organization Behaviour - Nature and characteristics of Organizational Behaviour- scope/ key elements of organizational behavior- OB Models- Importance of OB- role of managers in OB – Interpersonal, Informational, decisional roles, challenges & opportunities for OB- Limitations of organizational behavior.	**12**
Module 2	**Foundations of Individual Behavior:** Factors affecting Individual Behavior. Personality- Characteristics of Personality- Determinants of personality- Personality traits influencing OB. **Attitudes -** Features of Attitude- components of attitude- attitude formation- major types of work-related attitudes. **Job Satisfaction**- Ways to Measure Job Satisfaction- Causes & Impacts of job satisfaction.	**12**
Module 3	**Emotions, Perception and Learning:** **Emotions & Moods**- Basic Set of Emotions- Sources of Emotions and Moods- Emotional Labor- Emotional Intelligence - Elements of Emotional Intelligence- OB Applications of Emotions and Moods. **Perception-** Factors influencing perception - Perceptual Process- Importance of Perception in OB-Perception and Individual Decision Making- Group Organisational decision-making **Learning**- Nature of learning- Factors affecting learning- components of learning process.	**12**
	Motivation and Group Dynamics: **Motivation:** Concept, importance and theories of motivation. Maslow's Theory	

Module 4	of hierarchical needs, Hertzberg's two-factor Theory, McClelland's Theory of Needs, Vroom's Theory of Expectancy. **Group Dynamics:** Meaning of groups and group dynamics, Formation, Characteristics and Types of groups, Group cohesiveness - Factors influencing group cohesiveness - Group decision making process.	**12**

Skill Development:

1. Visit any organization and make a study on factors affecting perception.
2. Collect Bio-data of Motivational theory Proposers.
3. Visit nearby organization and analyse the Role of Managers.
4. Make a survey on measures followed by organization regarding Job Satisfaction
5. Any other activity relevant to the course.

Reference Books:

1. Organisation Behaviour An Evidence Approach – Fred Luthans McGraw Hill
2. Organisation Behaviour – Stephen P Robins Timorty A Judge
3. Organisation Behaviour by K. Ashwathappa
4. A Text Book of Organisational Behaviour -With Text and cases -CB Gupta- S Chand New Delhi.
5. Personnel Management (Text and Cases) C B Memoria and V.S.P. Rao- Himalaya Publishing House, New Delhi
6. Strategic Management and Organisation Behaviour _ Dr. Suman Shetty N, Hyderali, Dr. Ravi M .N and Umesh Shetty, Professional Publication.

STRATEGIC MANAGEMENT

4 Hours per week **48 Hours**

COURSE OUTCOMES:

At the end of the course students would be able to:

1. Understand the basic concepts and principles of strategic management, analyse the internal and external environment of business
2. Develop and prepare organizational strategies that will be effective for the current business environment
3. Devise strategic approaches to managing a business successfully in a global context

COURSE CONTENTS:

Module	Particulars	No of hrs
Module 1	**Introduction to Strategy:** Introduction - Meaning and definition, nature and characteristics, scope of strategies and importance of strategy. Strategic intent, characteristics, hierarchy of strategic intent, vision, Mission, goals, objectives and plans. Difference between goals and objectives. Types of strategies -functional strategy, corporate level strategy (grand strategies), Corporate level strategy, operational and generic (cost, leadership, differentiation focus). Strategies for competitive advantage-Porters' model (in brief).	**12**
Module 2	**Strategic Management:** Introduction, meaning and definition, features – Scope and importance of Strategic Management - Strategic management process - Limitations of strategic Management. Meaning and definition, characteristics of Strategic decision, strategic decision making process – Advantages and limitations of strategic decision making - Role of top Management in strategic decision making.	**12**
Module 3	**Environmental Analysis:** Meaning of Business-features, Concept of Business Environment, Features of Business Environment and Types of business Environment –Internal Environment and External Environment. Internal Environment –Structure, Value System, Core Competencies, Stake holders and Resources. Methods of Internal analysis. External Environment analysis, Micro Environment – employees, suppliers, Customers, Shareholders, General public. Macro Environment – Economic Environment – economic systems, economic policies & economic conditions, Political and legal, environment - Democracy and totalitarian, constitutional	**12**

	environment- Socio-Cultural Environment. Meaning of Culture, elements of culture, ethics and impact of culture on business – Technological Environment. SWOC and SOAR Analysis	
Module 4	**Strategy Formulation and Implementation:** Introduction, meaning and need for strategic formulation, process. understanding strategic intent through vision mission - external environmental analysis, organizational (internal)analysis, formulation of corporate level / grand strategies, business level strategies, strategic analysis and choice. Strategy Implementation process - Reasons for Strategy failure- methods to overcome strategy failure (organizational structure, leadership, culture, style). Meaning of Strategic Business Unit (SBU) - BCG Matrix.	**12**

Skill Development Activities:

1. Visit any business organization and collect the information about their vision and mission.
2. Visit any business organization and collect different types of authority followed and also the draw the organizational structure.
3. Visit any manufacturing firm and identify their value system.

Reference Books:

1. Strategic Management -John A Pearce ,Richard B Robinson and Amita Mital - McGraw Hill
2. Strategic Management - Azhar Kazmi Adela Kazhmi- Mcgraw Hill
3. Strategic Management –The Indian Context – R Srinivasan PHI
4. Strategic management – CB Gupta - S Chand New Delhi
5. Business Environment – Francis Cherunilam – Himalaya Publications
6. Essentials of Business Environment - K Aswathappa- Himalaya publishing House
7. Business Environment – Dr. Vivek Mittal –Excel books
8. Business Environment—Raj Agrawal- Excel books
9. Strategic Management and Organisation Behaviour - Dr. Suman Shetty N, Hyderali, Dr. Ravi M .N and Umesh Shetty Professional Publication
10. Strategic Management and Organisation Behaviour - K.S Adiga
11. Strategic Management and Organisation Behaviour - Dr Herald Monis
12. Strategic Management and Organisational Behaviour – Dr Udayachandra P and Dr Praveen KC - Himalaya Publishing House
13. Strategic Management and Organisational Behaviour - Chandrashekara .K and Dr. Parameshwara - New United Publishers

Notes:

1. Semester End Exams will be for 3 hours duration and for 80 marks.
2. Two internal Assessment exams of 1 hour duration for 30 marks each must be conducted.
3. Internal Assessment will be for 20 marks. It encompasses 10 marks for two internal assessment exams (5 marks each), 5 marks for Assignment & 5 marks for Class Test/Course Activity/Quizzes/Workshops, etc.
4. Wherever possible, the teacher must be able to focus more on practical insights rather than just theoretical foundation alone.
5. All the above courses must enhance student productivity and encourage them to take up either fruitful employment or entrepreneurship or higher education of their choice.

Question Paper Pattern

Internal Exams

Total Marks: 30
Time: 1 hour

Section A

Answer any one of the following 4 * 1 = 4

1. XXXX
2. XXXX
3. XXXX

Section B

Answer any one of the following 10 * 1 = 10

4. XXXX
5. XXXX
6. XXXX

Section C

Answer any one of the following 16 * 1 = 16

7. XXXX
8. XXXX

Question Paper Pattern

Semester End Exams

Total Marks: 80

Time: 3 hours

Section A

Answer any four of the following 4 * 4 =16

1. XXXX
2. XXXX
3. XXXX
4. XXXX
5. XXXX
6. XXXX

Section B

Answer any four of the following 8 * 4 = 32

7. XXXX
8. XXXX
9. XXXX
10. XXXX
11. XXXX
12. XXXX

Section C

Answer any two of the following 16 * 2 = 32

13. XXXX
14. XXXX
15. XXXX
16. XXXX

ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ–(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ಕಲಾಗಂಗೋತ್ರಿ– ಬಿ.ಎ

Course Out Comes:

೧. ಸಂಪರ್ಕ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಮೌಲ್ಯಗಳನ್ನು ಬಹುಶಿಸ್ತೀಯ ಪದವಿ ಕೋರ್ಸುಗಳಲ್ಲಿ ಬೆಳೆಸುವುದು ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶ

೨. ಸಾಹಿತ್ಯ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯಿಕ ಅಭಿರುಚಿ ಮೂಡಿಸುವ ಉದ್ದೇಶ.

೩. ನಾಡು–ನುಡಿಯ ಅಭಿಮಾನವನ್ನು ಬೆಳೆಸುವಲ್ಲಿ ಪೂರಕ.

೪. ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯದಿಂದ ಮಾತ್ರ ಸಮಾಜದಲ್ಲಿ ಮನುಷ್ಯ ಉತ್ತಮ ನಾಗರಿಕನಾಗಿ ಬದುಕಲು ಅಗತ್ಯವಾದ ಸಂವೇದನೆಯನ್ನು ಹುಟ್ಟು ಹಾಕಲು ಸಾಧ್ಯ

೫. ಭಾಷೆ ಕೇವಲ ಮಾಧ್ಯಮವಾಗಿರದೇ ಅದೊಂದು ಸಂಸ್ಕೃತಿಯಾಗಿರುತ್ತದೆ.

೬. ನಾಡು– ನುಡಿ ಜಲ, ಭೂಮಿ, ಸಮಕಾಲೀನ ಸವಾಲುಗಳನ್ನು ಕನ್ನಡಾದ ಅತ್ಯುತ್ತಮ ಪಠ್ಯಗಳ ಮುಖಾಂತರ ಕಲಿಸಬಹುದೆನ್ನುವ ನಂಬಿಕೆ.

೭. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ನಮ್ಮ ಸಮೃದ್ಧ ಸಾಂಸ್ಕೃತಿಕ, ಸಾಹಿತ್ಯಿಕ ಪರಂಪರೆಯ ಅರಿವು ಮೂಡಬೇಕು ಎಂಬ ಕಾಳಜಿ.

೮. ಸೃಜನಶೀಲತೆ ಮತ್ತು ಸಂವಹನ ಕೌಶಲ್ಯವನ್ನು ಕಲಿಯುವುದು ಇಂದಿನ ಅತೀ ತುರ್ತು, ಅದಕ್ಕೆ ಭಾಷಾ ಬೋಧನೆ ಅತೀ ಅಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿ.ಎ/ ಬಿಎ. ಬಿಎಸ್ ಡಬ್ಲ್ಯು/ಬಿಎ. ಹೆಚ್ಆರ್‌ಡಿ/ಬಿಎ. ಎಸ್‌ಡಿಎಸ್

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಕಲಾಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಸ್ಮಶಾನ ಕುರುಕ್ಷೇತ್ರಂ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿ.ಎ/ ಬಿಎ. ಬಿಎಸ್ ಡಬ್ಲು/ಬಿಎ. ಹೆಚ್ಆರ್‌ಡಿ/ಬಿಎ. ಎಸ್‌ಡಿಎಸ್

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಕಲಾಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಕಾಮನ ಹುಣ್ಣಿಮೆ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ– ಬಿ.ಕಾಂ

Course Out Comes:

೧. ಹಲವು ಬಗೆಯ ಬಿಕ್ಕಟ್ಟುಗಳು ಮತ್ತು ವಿಷಮತೆಗಳು ಹೆಚ್ಚುತ್ತಿರುವ ಈ ಕಾಲಘಟ್ಟದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರಜ್ಞಾವಂತರನ್ನಾಗಿ, ಸಂವೇದನಾಶೀಲರನ್ನಾಗಿ ಮಾಡುವ ಅವಕಾಶ ಭಾಷಾ ಪಠ್ಯಗಳಲ್ಲಿ ಇರುತ್ತದೆ.

೨. ಕನ್ನಡವನ್ನು ಜ್ಞಾನದ ಭಾಷೆಯಾಗಿ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನೀಡಬೇಕೆನ್ನುವ ಆಶಯ.

೩. ಇಂದಿನ ಶಿಕ್ಷಣದ ಮುಖ್ಯ ಗುರಿ ಉದ್ಯೋಗ ಮತ್ತು ಕೌಶಲ್ಯಗಳೇ ಆಗಿವೆ. ಹೀಗಾಗಿ ತಾಯಿ ಭಾಷೆ ಕನ್ನಡದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ಥಳೀಯ ರಾಷ್ಟ್ರೀಯ ಮತ್ತು ಜಾಗತಿಕ ಸವಾಲುಗಳನ್ನು ಸನ್ನದ್ಧರಾಗುವ ಬಗೆಯಲ್ಲಿ ಬೋಧಿಸುವ ಉದ್ದೇಶ

೪. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯಕ ಅಭಿರುಚಿಯನ್ನು ಹೆಚ್ಚಿಸುವ ಉದ್ದೇಶ.

೫. ವ್ಯವಹಾರದಲ್ಲಿ ಯಶಸ್ಸು ಕಾಣಲು ಸುಲಲಿತವಾದ ಭಾಷೆಯ ಕಲಿಕೆಯ ಅಗತ್ಯವಿದೆ.

೬. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃಯ ಬೆಳಕು ನೀಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಉದ್ದೇಶ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಕಾಂ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಏಕಲವ್ಯ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಕಾಂ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ವಾಣಿಜ್ಯಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಕಿರಗೂರಿನ ಗಯ್ಯಾಳಿಗಳು)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಕಾಂ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ ಒಟ್ಟು –೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ – ಬಿಎಸ್ಸಿ

Course Out Comes:

೧. ಭಾಷೆಸಂವಹನ ಕೌಶಲ್ಯದ ಜೊತೆಗೆ ಎಲ್ಲಾ ಜ್ಞಾನ ಶಸ್ತ್ರಗಳನ್ನು ಜೋಡಿಸುವ ಕೆಲಸವನ್ನು ಮಾಡುತ್ತದೆ.

೨. ಭಾಷೆ ಸಂವಹನ ಮಾಧ್ಯಮದ ಜೊತೆಗೆ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಮೌಲ್ಯಗಳನ್ನು ಬಹುಶಿಸ್ತೀಯ ಪದವಿ ಕೋರ್ಸುಗಳಲ್ಲಿ ಬೆಳೆಸುವುದು ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶ.

೩. ವಿಜ್ಞಾನದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕಲೆ, ಸಾಹಿತ್ಯ ಅಭಿರುಚಿಯನ್ನು ಮೂಡಿಸುವುದು

೪. ವೈಚಾರಿಕತೆಯ ಜೊತೆಗೆ ಸಾಹಿತ್ಯದಲ್ಲಿ ಚರ್ಚಿತವಾದ ತಂತ್ರಜ್ಞಾನ, ಪರಿಸರ, ಆಧುನಿಕತೆಯ ಪ್ರಭಾವ ವ್ಯಕ್ತಿ, ಸಮಾಜದ ಪರಿವರ್ತನೆ ಇವುಗಳನ್ನೆಲ್ಲಾ ಕಲಿಸುವ ಉದ್ದೇಶ.

೫. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಾಮಾನಗಳ ಅರಿವು ಸಂಸ್ಕೃತಿಯ ಬೆಳಕು ನೀಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಉದ್ದೇಶ.

೬. ವಿಜ್ಞಾನದ ಮೂಲಕ ವೈಜ್ಞಾನಿಕತೆಯನ್ನು ಕಲಿತವರು, ಸಾಹಿತ್ಯದ ಮೂಲಕ ಬಾಂದವ್ಯ ಉಳಿಸಿಕೊಳ್ಳಲು ಭಾಷೆಯ ಬೋಧನೆ ಅತ್ಯಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಎಸ್ಸಿ/ಬಿಎಸ್ಸಿ (ಎಫ್ಎನ್‌ಡಿ)/ಬಿಎಸ್ಸಿ (ಹೆಚ್ಎಸ್)/ಬಿಎಸ್ಸಿ (ಸಿಎಸ್)/ ಬಿಎಸ್ಸಿ (ಫ್ಯಾಶನ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಗಾರ್ಮೆಂಟ್ ಡಿಸೈನ್) /ಬಿಎಸ್ಸಿ (ಲೆದರ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಇಂಟಿರಿಯರ್ ಡಿಸೈನ್ ಆಂಡ್ ಡೆಕೊರೇಶನ್) ಬಿಎಸ್ಸಿ (ಅನಿಮೇಶನ್ ಆಂಡ್ ವಿಜುವಲ್ ಇಫೆಕ್ಟ್) ಬಿಎಸ್ಸಿ (ಕೌನ್ಸಿಲಿಂಗ್) ಬಿಎಸ್ಸಿ (ಪುಡ್ ಟೆಕ್ನಾಲಜಿ)

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಅಂತಿಗೊನೆ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಎಸ್ಸಿ/ಬಿಎಸ್ಸಿ (ಎಫ್ಎನ್‌ಡಿ)/ಬಿಎಸ್ಸಿ (ಹೆಚ್ಎಸ್)/ಬಿಎಸ್ಸಿ (ಸಿಎಸ್)/ ಬಿಎಸ್ಸಿ (ಫ್ಯಾಶನ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಗಾರ್ಮೆಂಟ್ ಡಿಸೈನ್) /ಬಿಎಸ್ಸಿ (ಲೆದರ್ ಡಿಸೈನ್)/ ಬಿಎಸ್ಸಿ (ಇಂಟಿರಿಯರ್ ಡಿಸೈನ್ ಆಂಡ್ ಡೆಕೊರೇಶನ್) ಬಿಎಸ್ಸಿ (ಅನಿಮೇಶನ್ ಆಂಡ್ ವಿಜುವಲ್ ಇಫೆಕ್ಟ್) ಬಿಎಸ್ಸಿ (ಕೌನ್ಸಿಲಿಂಗ್) ಬಿಎಸ್ಸಿ (ಪುಡ್ ಟೆಕ್ನಾಲಜಿ)

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ವಿಜ್ಞಾನಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೪೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಒಡಲಾಳ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಎಸ್ಸಿ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ನಿವರ್ಹಣಾ ಗಂಗೋತ್ರಿ – ಬಿ.ಬಿ.ಎ

Course Out Comes:

೧. ನಿರ್ವಹಣಾ ಶಾಸ್ತ್ರದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕಲೆ– ಸಾಹಿತ್ಯ ಸಂಸ್ಕೃತಿಯ ಅಭಿರುಚಿಯನ್ನು ಹುಟ್ಟು ಹಾಕುವ ಉದ್ದೇಶ.

೨. ಭಾಷೆಯ ಕಲಿಕೆಯ ವಾಧ್ಯಮದ ಜೊತೆಗೆ ವೈಯಕ್ತಿಕ, ಸಾಮಾಜಿಕ, ಆಡಳಿತಾತ್ಮಕ ಔದ್ಯೋಗಿಕ, ವಾಣಿಜ್ಯ ವ್ಯವಹಾರ, ನಿರ್ವಹಣೆಗಳ ಮೇಲೆ ಮಹತ್ವವನ್ನು ನೀಡುವುದಾಗಿದೆ.

೩. ಕಲೆ, ಸಾಹಿತ್ಯ, ನಾಡು– ನುಡಿಯ, ಅಭಿಮಾನದ ಜೊತೆಗೆ ನೈತಿಕತೆಯ ಅರಿವು ಪಡೆಯಲು ಭಾಷಾ ಬೋಧನೆಯ ಅಗತ್ಯ.

೪. ವಿದ್ಯಾರ್ಥಿಗಳ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃತಿಯ ಕಲಿಕೆಯಲ್ಲಿ ಭಾಷಾ ಬೋಧನೆಯ ಮಹತ್ವದ ಪಾತ್ರವನ್ನು ವಹಿಸುತ್ತದೆ.

೫. ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಭಾಷಾ ಕೌಶಲ್ಯ, ಸಾಹಿತ್ಯದ ಮಾನವೀಯ ಸಂವೇದನೆ, ಸಮಕಾಲೀನ ವಿದ್ಯಮಾನಗಳ ಅರಿವು, ಸಂಸ್ಕೃತಿ, ರಾಷ್ಟ್ರೀಯತೆಯ ಮನೋಭಾವವನ್ನು ಕಟ್ಟಿಕೊಡುವಲ್ಲಿ ಯಶಸ್ವಿಯಾಗುವ ಆಶಯ.

೬. ವಿದ್ಯಾರ್ಥಿಗಳು ಸಮಾಜದಲ್ಲಿ ಉತ್ತಮ ನಾಗರಿಕನಾಗಿ ಬದುಕಲು ಅಗತ್ಯವಾದ ಸಂವೇದನೆಯನ್ನು ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ ರೂಪಿಸುತ್ತದೆ. ಭಾಷೆ ಕೇವಲ ಮಾಧ್ಯಮವಾಗಿರದೆ ಅದೊಂದು ಸಂಸ್ಕೃತಿಯಾಗಿರುತ್ತದೆ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಬಿಎ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ನಿರ್ವಹಣಾಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಯಶೋಧರಾ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಬಿಎ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ನಿರ್ವಹಣಾಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ಕಾದಂಬರಿ (ಮುಖಾಂತರ)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಬಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು –೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8
(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8
(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8
(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿ––(SEP 2024)

ಭಾಷಾ ಬೋಧನೆಯ ಉದ್ದೇಶಗಳು

ಗಣಕ ಗಂಗೋತ್ರಿ – ಬಿ.ಸಿ.ಎ

Course Out Comes:

೧. ಗಣಕ ವಿಜ್ಞಾನದ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯದ ಅಭಿರುಚಿ ಮೂಡಿಸುವ ಉದ್ದೇಶ.

೨. ಕಂಪ್ಯೂಟರ್ ಯುಗದಲ್ಲಿ ಜೀವನ ಯಾಂತ್ರಿಕವಾಗದಿರಲು ಭಾಷೆಯ ಮೂಲಕ ಕಲೆ, ಸಾಹಿತ್ಯ,ಸಂಸ್ಕೃತಿಯ ಕಲಿಕೆ ಇಂದಿನ ಅಗತ್ಯ.

೩. ಹಲವು ಬಗೆಯ ಬಿಕ್ಕಟ್ಟುಗಳು ಮತ್ತು ವಿಷಮತೆಗಳು ಹೆಚ್ಚುತ್ತಿರುವ ಈ ಕಾಲಘಟ್ಟದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರಜ್ಞಾವಂತರನ್ನಾಗಿ ಸಂವೇದನಾಶೀಲರನ್ನಾಗಿ ಮಾಡುವ ಅವಕಾಶ ಭಾಷಾ ಪಠ್ಯಗಳಲ್ಲಿ ಇರುತ್ತದೆ.

೪. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯಗಳನ್ನು ಕುರಿತ ಪ್ರೀತಿಯನ್ನು ಹೆಚ್ಚಿಸಬೇಕು ಆ ಮೂಲಕ ನಮ್ಮ ಸಮೃದ್ಧ, ಸಾಂಸ್ಕೃತಿಕ ಸಾಹಿತ್ಯಕ ಪರಂಪರೆಯ ಅರಿವು ಅವರಲ್ಲಿ ಮೂಡಬೇಕು ಎಂಬ ಆಶಯ.

೫. ಕಂಪ್ಯೂಟರ್ ಯುಗದಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಮಾನವೀಯ ಸಂವೇದನೆಯನ್ನು ಹುಟ್ಟು ಹಾಕಲು ಭಾಷಾ ಬೋಧನೆಯು ಅಗತ್ಯ

೬. ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ, ಭಾಷೆಯ ಬಳಕೆಯ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಕಲಿಯಲು ಭಾಷಾ ಬೋಧನೆಯು ಅಗತ್ಯ.

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಸಿಎ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಗಣಕಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನಾಟಕ (ಯುದ್ಧಭಾರತ)	೧೨ ಗಂಟೆ	೨೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಬಿಸಿಎ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಗಣಕಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೪ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೪೮ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್:೩ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೨೪ ಗಂಟೆ	೪೦
೨. ಗದ್ಯಭಾಗ	೧೨ ಗಂಟೆ	೨೦
೩. ನೀಳ್ಗತೆ(ಮಣ್ಣು)	೧೨ ಗಂಟೆ	೨೦

ಪ್ರಥಮ ಬಿಸಿಎ

ಪ್ರಥಮ ಸೆಮಿಸ್ಟರ್ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮಾದರಿ

ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ– ಅಂಕಗಳ ವಿಂಗಡಣೆ

ಒಟ್ಟು ೮೦ ಅಂಕಗಳು

ಕಾವ್ಯ– ೪೦ ಅಂಕಗಳು

ಗದ್ಯ– ೨೦ ಅಂಕಗಳು

ನಾಟಕ– ೨೦ ಅಂಕಗಳು

I. 8 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸುವುದು 8x3=24

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

II. 5 ಅಂಕಗಳ ಒಟ್ಟು 3 ಪ್ರಶ್ನೆಗಳ್ಲಿಗೆ ಉತ್ತರಿಸುವುದು 5x 3 =15

1 ಪ್ರಶ್ನೆ 1 ಪದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

2 ಪ್ರಶ್ನೆ 2 ಗದ್ಯ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

3 ಪ್ರಶ್ನೆ 3 ನಾಟಕ: ಆಂತರಿಕ ಆಯ್ಕೆಗೆ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು.

III. ಪದ್ಯ : ಭಾವಾರ್ಥ ಆಂತರಿಕ ಆಯ್ಕೆಗೆ 5 ಅಂಕಗಳ ಎರಡು ಪ್ರಶ್ನೆಗಳು ಒಂದನ್ನು ಉತ್ತರಿಸುವುದು 5 x1=5

IV. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಆಯ್ಕೆಗೆ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

V. ಪದ್ಯ: 4 ಅಂಕಗಳ 4 ಪ್ರಶ್ನೆಗಳು ಟಿಪ್ಪಣಿಗಾಗಿ ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು 4x2=8

(ಸಂದರ್ಭ ಸಹಿತ ಉತ್ತರಿಸುವುದು)

VI. ಗದ್ಯ ಹಾಗೂ ನಾಟಕದಿಂದ 2+2 ರಂತೆ ಪ್ರಶ್ನೆಗಳು (ಟಿಪ್ಪಣಿಗಾಗಿ) ಎರಡನ್ನು ಉತ್ತರಿಸುವುದು. 4x2=8

(ಗದ್ಯದಿಂದ 2+ ನಾಟಕದಿಂದ2)

VII ಒಂದು ಅಂಕದ 12 ಪ್ರಶ್ನೆಗಳು 1x112= 12

ಕಾವ್ಯ– ೬ ಪ್ರಶ್ನೆಗಳು

ಗದ್ಯ– ೩ ಪ್ರಶ್ನೆಗಳು

ನಾಟಕ– ೩ ಪ್ರಶ್ನೆಗಳು

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ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಕನ್ನಡ ಐಚ್ಛಿಕ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ–೧

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೭೨ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್: ೦೫ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು = ೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: =೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೩೬ ಗಂಟೆ	೫೦
೨. ಸಣ್ಣಕತೆ	೧೦ ಗಂಟೆ	೩೦
೩. ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ	೨೦ ಗಂಟೆ	೩೦
೪. ಛಂದಸ್ಸು	೦೬ ಗಂಟೆ	೧೦

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

ಎಸ್.ವಿ.ಪಿ ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

SEPಗೆ ಅನುಗುಣವಾಗಿ ಕನ್ನಡ ಐಚ್ಛಿಕ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ–೨

ಕನ್ನಡ ಭಾಷೆ

ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಒಟ್ಟು ಬೋಧನಾವಧಿ: ೭೨ಗಂಟೆ

ಕೋರ್ಸ್ ಕ್ರೆಡಿಟ್: ೦೫ ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಅಂತಿಮ ಪರೀಕ್ಷಾ ಅವಧಿ=೩ ಗಂಟೆ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು = ೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: =೨೦

	ಬೋಧನಾವಧಿ	ಅಂಕಗಳು
೧. ಕಾವ್ಯ ಭಾಗ	೩೬ ಗಂಟೆ	೪೫
೨. ಗದ್ಯಭಾಗ	೧೦ ಗಂಟೆ	೨೫
೩. ನಾಟಕ	೧೦ ಗಂಟೆ	೨೦
೪. ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ	೨೦ ಗಂಟೆ	೩೦

ಪ್ರಥಮ ಬಿ. ಎ ಕನ್ನಡ ಐಚ್ಛಿಕ

ಪ್ರಥಮ ಚತುರ್ಮಾಸ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024) ಪಠ್ಯಕ್ರಮದಂತೆ

ಪಠ್ಯ: ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ – ೧

ಪ್ರಕಾಶಕರು: ಪ್ರಸಾರಾಂಗ, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ

ಬೋಧನಾವಧಿ– ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಪರೀಕ್ಷಾ ಅವಧಿ–೦೩ಗಂಟೆಗಳು ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಕ್ರೆಡಿಟ್–೦೫ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

ಹೊಸಗನಡ ಕಾವ್ಯ ಗದ್ಯ– ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ (ಚರಿತ್ರೆ)

ಕಾವ್ಯ ಭಾಗ ಬೋಧನಾವಧಿ (೩೫ ಗಂಟೆ– ಅಂಕ– ೩೫ ಅಂಕಗಳು)

೧. ತೂಕಡಿಕೆಯ ಕಳೆ – ಪಂಜೆ ಮಂಗೇಶರಾವ್

೨. ಕಾಣಿಕೆ– ಬಿ. ಎಂ ಶ್ರೀ

೩. ಗಂಗಾವತರಣ– ದ. ರಾ ಬೇಂದ್ರೆ

೪. ತನ್ನ ಕಾವ್ಯಕ್ಕೆ ತಾಂ ಮಹಾಕವಿ ಮಣಿವಂತೆ– ಕುವೆಂಪು

೫. ನಿಲ್ಲಿಸದಿರು ವನಮಾಲಿ– ಪು. ತಿ. ನ

೬. ರತ್ನನೆ ಪ್ರಪಂಚ – ಜಿ. ಪಿ ರಾಜರತ್ನಂ

೭. ನಾನೊಮ್ಮೆ ಚೆಲುವೆಯೊಬ್ಬಳನ್ನು ಪ್ರೀತಿಸಿದೆ– ಕೆ. ಎಸ್. ನರಸಿಂಹ ಸ್ವಾಮಿ

೮. ಹರಿಗೋಲು– ಮಚ್ಚಿಮಲೆ ಶಂಕರನಾರಾಯಣರು

೯. ಎಣ್ಣೆ ಹೊಯ್ಯಮ್ಮ ದೀಪಕ್ಕೆ –ಸೇಡಿಯಾಪು ಕೃಷ್ಣಭಟ್ಟ

೧೦.ಕಾರ್ಗಾಲದ ವೈಭವ – ಕಡೆಂಗೋಡ್ಲು ಶಂಕರಭಟ್ಟ

೧೧ ಬೆಂಕಿ ಬಿದ್ದಿದೆ ಮನೆಗೆ– ಕಯ್ಯಾರ ಕಿಞಣ್ಣ ರೈ

೧೨.ಕೆಲವು ವಚನಗಳು– ಎಸ್. ವಿ ಪರಮೇಶ್ವರಭಟ್ಟ

ಗದ್ಯ ಭಾಗ (ಸಣ್ಣಕಥೆಗಳು) ಬೋಧನಾವಧಿ– ೭ಗಂಟೆ– ಅಂಕಗಳು – ೨೦

೧. ಹೇಮ ಕೂಟದಿಂದ ಬಂದ ಮೇಲೆ – ಮಾಸ್ತಿ ವೆಂಕಟೇಶ ಅಯ್ಯಂಗಾರ್

೨. ಹೋಳಿಗೆ – ಶಿವರಾಮ ಕಾರಂತ

೩. ಶವದ ಮನೆ–ಚದುರಂಗ

೪. ಅವಳ ಉದ್ಧಾರ–ಗಿರಿಬಾಲೆ

೫. ಬಯಲಾಟ– ದೇವಾಂಗನಾ ಶಾಸ್ತ್ರಿ

ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ–ಬೋಧನಾವಧಿ – ೨೫ಗಂಟೆ ಅಂಕಗಳು –೨೫

೧. ನವೋದಯ ಪೂರ್ವ ನವೋದಯ ಸಾಹಿತ್ಯದ ಪ್ರೇರಣೆ ಮತ್ತು ಪ್ರಭಾವ ನವೋದಯ ಕಾಲ ಘಟ್ಟದ ಪ್ರಮುಖ ಸಾಹಿತ್ಯ ಸ್ವರೂಪಗಳ ಕೊಡುಗೆ – ಕಾವ್ಯ, ನಾಟಕ , ಸಣ್ಣಕಥೆ, ಕಾದಂಬರಿ

೨. ಪ್ರಗತಿಶೀಲ ಸಾಹಿತ್ಯ – ಪ್ರೇರಣೆ ಪ್ರಭಾವ– ಅನಕೃ, ತ.ರಾ.ಸು, ನಿರಂಜನ, ಕಟ್ಟಿಮನಿಯವರ ಪರಿಚಯ

೩. ಮಹಿಳಾ ಸಾಹಿತ್ಯ– ಪ್ರೇರಣೆ ಮತ್ತು ಪ್ರಭಾವ – ಕಥೆಗಾರರು ಮತ್ತು ಕಾದಂಬರಿಕಾರರ ಪರಿಚಯ

ಸೂಚನೆ: ಸಾಹಿತ್ಯ ಗಂಗೋತ್ರಿ– ೧ ಪಠ್ಯದ ಹೊಸಗನ್ನಡ ಛಂದಸ್ಸನ್ನು ಸಂಪೂರ್ಣ ಕೈಬಿಡಲಾಗಿದೆ.

ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024)

ಕನ್ನಡ ಐಚ್ಛಿಕ (ಪ್ರಥಮ ಚತುರ್ಮಾಸ)

ಒಟ್ಟು ಅಂಕಗಳು: 80

ಪರೀಕ್ಷೆ:೩ ಗಂಟೆಗಳು ಘಟಕ–೧ ಕಾವ್ಯ 35 ಅಂಕಗಳು

I ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ: 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

II ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 02x04=08
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

III ಮೂರಕ್ಕೆ ಸಂದರ್ಭ ಸ್ವಾರಸ್ಯ ಬರೆಯಿರಿ. 03x04=12
ಐದು ವಾಕ್ಯಗಳನ್ನು ನೀಡುವುದು

IV ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ 01x05=05
ಐದು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೨ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ 25 ಅಂಕಗಳು

V ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

VI ಮೂರು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 03x04=12
ಐದು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

VII ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 01x03=03
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

ಘಟಕ ೩ ಕಥೆಗಳು 20 ಅಂಕಗಳು

VIII ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

IX ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ 02x03=06
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

X ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 04x01=04
ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

ಪ್ರಥಮ ಬಿ. ಎ ಕನ್ನಡ ಐಚ್ಛಿಕ

ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024) ಪಠ್ಯಕ್ರಮದಂತೆ

ಪಠ್ಯ: ಸಾಹಿತ್ಯಗಂಗೋತ್ರಿ – ೨

ಪ್ರಕಾಶಕರು: ಪ್ರಸಾರಾಂಗ, ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಮಂಗಳಗಂಗೋತ್ರಿ

ಬೋಧನಾವಧಿ– ವಾರಕ್ಕೆ ೬ ಗಂಟೆಗಳು

ಪರೀಕ್ಷಾ ಅವಧಿ–೦೩ಗಂಟೆಗಳು ಒಟ್ಟು ಅಂಕಗಳು: ೧೦೦

ಕ್ರೆಡಿಟ್–೦೫ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು =೮೦

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು: ೧೦ + ೧೦=೨೦

ಕಾವ್ಯ – ನಾಟಕ – ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ (ನವ್ಯ, ನವ್ಯೋತ್ತರ)

ಕಾವ್ಯ ಭಾಗ

೧. ಆದಿಮನ ಅನ್ನ ಸಮಸ್ಯ– ವಿನಾಯಕ

೨. ಚಿಂತಾಮಣಿಯಲಿ ಕಂಡಮುಖ– ಗೋಪಾಲಕೃಷ್ಣ ಅಡಿಗ

೩. ಅಸ್ತಮಾನ– ಜಿ. ಎಸ್. ಶಿವರುದ್ರಪ್ಪ

೪. ಸಾಧನೆ– ಚೆನ್ನವೀರ ಕಣವಿ

೫. ಶಿವನ ಮೀಸುವ ಹಾಡು– ವೈದೇಹಿ

೬. ಅವ್ವ– ಎಲ್. ಹನುಮಂತಯ್ಯ

೭. ಸತಿ ಹೋಗುವುದಿಲ್ಲ ನಾನು – ಸವಿತ ನಾಗಭೂಷಣ

೮.

ನಾಟಕ

೧. ಗೋಂದೋಳು– ಅಮೃತ ಸೋಮೇಶ್ವರ

ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ– ಎಲ್.ಎಸ್. ಶೇಷಗಿರಿ ರಾವ್

೧. ನವ್ಯ ಸಾಹಿತ್ಯ

೨. ದಲಿತ – ಬಂಡಾಯ ಸಾಹಿತ್ಯ

೩. ನವ್ಯ , ದಲಿತ, ಬಂಡಾಯ ಕಾಲಘಟ್ಟದ ಮಹಿಳಾ ಸಾಹಿತಿಗಳು

ಸೂಚನೆ: ಸಾಹಿತ್ಯ ಗಂಗೋತ್ರಿ– ೨ ಪಠ್ಯದ ಗದ್ಯಭಾಗವನ್ನು ಸಂಪೂರ್ಣ ಕೈಬಿಡಲಾಗಿದೆ.

ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

ಮಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ (SEP 2024)

ಕನ್ನಡ ಐಚ್ಛಿಕ (ದ್ವಿತೀಯ ಚತುರ್ಮಾಸ)

ಒಟ್ಟು 80 ಅಂಕಗಳು

ಪರೀಕ್ಷೆ: ೩ ಗಂಟೆಗಳು ಘಟಕ–೧ ಕಾವ್ಯ 30 ಅಂಕಗಳು

I ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ: 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

II ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 02x04=08
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

III ಮೂರಕ್ಕೆ ಸಂದರ್ಭ ಸ್ವಾರಸ್ಯ ಬರೆಯಿರಿ. 03x04=12
ಐದು ವಾಕ್ಯಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೨ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ 22 ಅಂಕಗಳು

IV ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು

V ಮೂರು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. 03x04=12
ಐದು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

ಘಟಕ ೩ ಕಥೆಗಳು 28 ಅಂಕಗಳು

VI ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿರಿ. 01x10=10
ಮೂರು ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡುವುದು.

VII ಎರಡು ವಿಷಯಗಳಿಗೆ ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ 02x03=06
ನಾಲ್ಕು ಟಿಪ್ಪಣಿಗಳನ್ನು ನೀಡುವುದು

VIII ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. 01x12=12
ಕಾವ್ಯ ಭಾಗದಿಂದ ೫ ಪ್ರಶ್ನೆಗಳು
ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಭಾಗದಿಂದ ಮೂರು ಪ್ರಶ್ನೆಗಳು
ನಾಟಕ ಭಾಗದಿಂದ ನಾಲ್ಕು ಪ್ರಶ್ನೆಗಳು

Mangalore University

Mangalagangothri -574 199

SYLLABUS

V and VI Semester
B.A./B.Sc. (Hons) Mathematics,

(ACCORDING TO NATIONAL EDUCATION POLICY 2020)

2023

Name of the Degree Program : **B.A./B.Sc.**
Discipline Course : **Mathematics**
Starting Year of Implementation : **2021-22 (I & II Semesters)**
2022-23 (III & IV Semesters)
2023-24 (V & VI Semesters)

Assessment

Weightage for the Assessments (in percentage)

Type of Course	Formative Assessment/ I.A.	Summative Assessment (S.A.)
Theory	40%	60 %
Practical	50%	50 %
Projects	40 %	60 %
Experiential Learning (Internship etc.)	--	--

Courses Offered

Semester	Course No.	Theory/ Practical	Credits	Paper Title	Marks in percentage	
					S. A.	I.A.
V	MATDSCT5.1	Theory	4	Real Analysis-II and Complex Analysis	60	40
	MATDSCP5.1	Practical	2	Theory based Practicals on Real Analysis-II and Complex Analysis	25	25
	MATDSCT5.2	Theory	4	Algebra and Graph Theory	60	40
	MATDSCP5.2	Practical	2	Theory based Practicals on Algebra and Graph Theory	25	25
VI	MATDSCT6.1	Theory	4	Linear Algebra	60	40
	MATDSCP6.1	Practical	2	Theory based Practicals on Linear Algebra	25	25
	MATDSCT6.2	Theory	4	Numerical Analysis	60	40
	MATDSCP6.2	Practical	2	Theory based Practicals on Numerical Analysis	25	25

Syllabus for B.A./B.Sc. with Mathematics

SEMESTER – V

MATDSCT 5.1: Real Analysis-II and Complex Analysis	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes:

The overall expectation from this course is that the student builds a basic understanding on Riemann integration and elementary complex analysis. The broader course outcomes are listed as follows. At the end of this course, the student will be able to:

1. Carry out computations of upper and lower Riemann sums as well definite integrals.
2. Describe various criteria for Integrability of functions.
3. Evaluate some improper integrals and Evaluate double integrals by using Beta, Gamma functions.
4. Exhibit certain properties of mathematical objects such as integrable functions, analytic functions, harmonic functions and so on.
5. Prove some statements related to Riemann integration as well as in complex analysis.
6. Carry out the existing algorithms to construct mathematical structures such as analytic functions.
7. Evaluate complex line integrals using definition and some well known theorems.
8. Apply the gained knowledge to solve various other problems.

Real Analysis-II

Unit – I: Riemann Integration

Definition and Existence of the Integral, Riemann Darboux Sums - Upper and lower (Darboux) sums - definition, properties and problems. Riemann Integral - Upper and Lower integrals (definition & problems), Inequalities for Integrals, Refinement of Partitions, Darboux's theorem, Conditions of Integrability, Integrability of Sum, Difference, Product, Quotient and Modulus of integrable functions. Integral as a limit of sum (Riemann sums), Some Applications, Some Integrable Functions – Integrability of continuous functions, monotonic functions, bounded function with finite number of discontinuity.

15 Hour

Unit –II: Improper Integrals

Improper integrals of the first, second and third kind with examples. Improper integral as the limit of the proper integral. Comparison test, Abel's test and Dirichlet's test for the convergence of the integral of a product of two functions. Beta, Gamma functions - Definitions, properties and examples, Relations between Beta and Gamma functions, Applications to evaluation of definite integrals, Duplication formula and applications.

15 Hours

Complex Analysis

Unit – III: Complex numbers and functions of complex variables:

Complex numbers: Sums and Products, Basic Algebraic Properties, Further Properties, Vectors and Moduli, Complex Conjugates, Exponential Form, Products and Powers in Exponential Form, Arguments of Products and Quotients, Roots of Complex Numbers, and examples, Regions in the complex plane.

Analytic Functions: Functions of a Complex Variable, Mappings, Mappings by the Exponential Function, Limits, Theorems on Limits, Limits Involving the Point at Infinity, Continuity, Derivatives, Differentiation Formulas, Cauchy–Riemann Equations, Sufficient Conditions for Differentiability, Polar Coordinates, Analytic Functions and examples, Harmonic Functions.

15 Hours

Unit –IV: Complex Integration

Derivatives and Definite Integrals of Complex valued Functions of Real Variable, Contours, and Contour Integrals with Examples, Examples with Branch Cuts, Upper Bounds for Moduli of Contour Integrals, Antiderivatives, Cauchy–Goursat Theorem, Simply Connected Domains, Multiply Connected Domains, Cauchy Integral Formula, An Extension of Cauchy Integral Formula, Some Consequences of the Extension.

15 Hours

Reference Books:

[1] S.C. Malik and Savita Arora, *Mathematical Analysis*, 2nd ed. New Delhi, India: New Age international (P) Ltd.

[2] Maurice D. Weir, George B. Thomas, Jr., Joel Hassand Frank R. Giordano, Thomas' Calculus, 11th Ed., Pearson, 2008.

[3] R.V. Churchil & J.W. Brown, *Complex Variables and Applications*, 5th ed, McGraw Hill Companies.

[4] S.C Malik, *Real Analysis,* New Age International (India) Pvt. Ltd.

[5] Richard R Goldberg, *Methods of Real Analysis*, Oxford and IBH Publishing.

[6] Ajit Kumar and S. Kumaresan - *A Basic Course in Real Analysis*, Taylor and Francis Group.

[7] L. V. Ahlfors, *Complex Analysis*, 3rd Edition, McGraw Hill Education.

[8] Bruce P. Palka *, Introduction to the Theory of Function of a Complex Variable*, Springer

[9] Serge Lang, *Complex Analysis*, Springer.

[10] Shanthinarayan, *Theory of Functions of a Complex Variable,* S. Chand Publishers.

[11] S. Ponnuswamy, *Foundations of Complex Analysis*, 2nd Edition, Alpha Science International Limited.

[12] Grewal, B. S., & Grewal, J. S. (1996). Higher engineering mathematics. 42nd Ed., Khanna Publishers, New Delhi.

[13] Shanthi Narayan, P. K. Mittal (2004), Theory of Functions of a Complex Variable, Revised Ed. S. Chand and Company Ltd. New Delhi.

MATDSCP 5.1: Practicals on Real Analysis-II and Complex Analysis	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 60 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software* (FOSS) tools for computer programming
2. Solve problem on Real Analysis and Complex Analysis studied in MATDSCT 5.1 by using FOSS softwares.
3. Acquire knowledge of applications of Real Analysis and Complex Analysis through FOSS.

Practical/Lab Work to be performed in Computer Lab

Suggested Software: Maxima/Scilab/Python/R.
Suggested Programs:

1. Program to find upper and lower Riemann sums with respect to given partition
2. Program to test Riemann Integrability.
3. Program to evaluate Riemann integral as a limit of sum.
4. Program to check the convergence of the given improper integral using Abel's test.
5. Program to check the convergence of the given improper integral using Dirichlet's test.
6. Programs to evaluate improper integrals using Beta/Gamma Functions.
7. Program to illustrate applications of duplication formula for Beta/Gamma functions.
8. Program to find the nth roots of a given complex number.
9. Program on verification of Cauchy – Riemann equations (Cartesian form) or test for analyticity.
10. Program on verification of Cauchy – Riemann equations (Polar form) or test for analyticity.
11. Program to check whether a function is harmonic or not.
12. Program to construct analytic functions (through Milne–Thompson method).
13. Program to evaluate Definite Integrals of Complex valued Functions of Real Variable.
14. Program to illustrate evaluation of integrals using Cauchy's integral theorem.

MATDSCT5.2: Algebra and Graph Theory	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes: The overall expectation from this course is that the student builds a basic understanding on the theory of groups and some elementary concepts of graph theory. This course will enable the students to:

1. Know the significance of normal subgroups and quotient groups.
2. Understand structure preserving mapping between two algebraic structures of the same type.
3. Know the algebraic structures having the same structure with different elements.
4. Identify and analyze the algebraic structures such as ring, field and integral domain
5. Know the basic terminologies used in the theory of graphs.
6. Study the graphs which are used to model pair wise relations between the objects which will help in understanding the networking, optimization, matching and operation.
7. Understand the importance of cutsets, connectivity, planarity and colorability in the theory of graphs.
8. Apply graph theoretic tools to solve real life problems.

Algebra

Unit I: More on Groups

Congruence relation in subgroups, Cosets, Theorem on cosets, Lagrange's theorem and applications, Index of a subgroup, Normal Subgroups, Quotient groups. Homomorphism, Kernel of a homomorphism, Isomorphism, First Isomorphism theorem, Automorphisms. Permutation groups, Cycles, Transpositions, Type of permutations, Length of a cycle, Index of S_n, Alternating group, Order of a permutation.

15 hours

Unit II: Rings, Integral Domains, Fields

Rings : Definition and examples, Commutative Rings, Subrings, Integral Domain, Division Ring, Fields, Properties of Rings, Characteristic of an Integral Domain, Homomorphism, Kernel, Isomorphism, Ideals, First Isomorphism theorem in Rings, Prime and Maximal Ideals, Quotient Rings.

15 hours

Graph Theory

Unit III: Basics of Graph Theory

Graphs, Finite and infinite graphs, Incidence and degree, Isolated vertex, Pendent vertex, Null graph, Isomorphism, Sub graph, Walks, Paths, Circuits, Connected and Disconnected graphs, components, Euler graphs, Operation on graphs, Hamiltonian paths, Circuits, Tees and some properties of trees, Rooted and Binary trees, Spanning tree and Fundamental circuit.

15 hours

Unit IV: Connectivity, Planar Graphs and Coloring

Cutsets, Properties, Fundamental cut sets, Connectivity, and Separability. Planar graphs, Kuratowski's graphs, Different representation of planar graphs, Geometric duel. Graph Coloring: Chromatic number and Chromatic polynomials.

15 hours

Reference Books

[1] I N Herstein (1990), Topics in Algebra, 2nd Edition, Wiley Eastern Ltd., New Delhi.

[2] Vijay K Khanna and S K Bhambri (1998), A Course in Abstract Algebra, Vikas Publications.

[3] Michael Artin (2015), Algebra, 2nd ed., Pearson.

[4] Joseph A, Gallian (2021), Contemporary Abstract Algebra, 10th ed., Taylor and Francis Group.

[5] C. L. Liu (2000), Elements of Discrete Mathematics, Tata McGraw-Hill.

[6] Hari Kishan and Shiv Raj Pundir (2015), Discrete Mathematics, Pragathi Prakashan, 10th ed.

[7] W D Wallis (2017), A Beginner's Guide to Discrete Mathematics for Computer Science, Wiley Publishers.

[8] Kenneth H. Rossen, Discrete Mathematics and its Applications, Mc-Graw Hill, 8th ed., 2021.

[9] Frank Harary (1969), Graph Theory, Addison-Wesley Pub. Company.

[10] N. Deo (1990), Graph Theory: Prentice Hall of India Pvt. Ltd. New Delhi.

[11] D B West (2001), Introduction to graph theory 2nd Ed., Pearson.

MATDSCP5.2: Practicals Algebra and Graph Theory	
Teaching Hours : 4 Hours/Week	**Credits: 2**
Total Teaching Hours: 60 Hours	**Max. Marks: 50** **(S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problems related to Algebra and Graph Theory using FOSS software.

Practical/Lab Work to be performed in Computer Lab (FOSS) Suggested Software: Maxima/Scilab /Python/R.

Suggested Programs:

1. Verification of Lagrange's theorem
2. Examples to find left and right cosets and finding index of a group
3. Finding all Normal Subgroups of a group.
4. Finding whether a given Permutation is even and odd and its order.
5. Checking whether a given set is a ring with respect to given binary operations.
6. Checking whether a given set is an integral domain or field with respect to given binary operations.
7. Finding zero divisors and units in finite rings.
8. Verification of the given mapping for ring homomorphism.
9. Drawing some standard graphs like Dodecahedron, wheel graph, Peterson graph.
10. Checking planarity, finding number of edges, vertex and edge connectivity, center, radius, and diameter.
11. Checking for Hamiltonian path/circuit in a graph.
12. Checking for Eulerian path/cycle in a graph.
13. Finding shortest path between two vertices.
14. Finding vertex coloring and redrawing the graph with colouring for vertices and finding chromatic number.

SEMESTER – VI

MATDSCT 6.1: Linear Algebra	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes:

The overall expectation from this course is that the student will build a basic understanding in few areas of linear algebra such as vector spaces, linear transformations and inner product spaces. Some broader course outcomes are listed as follows. At the end of this course, the student will be able to

1. Understand the concepts of Vector spaces, subspaces, bases dimension and their properties.
2. Find a basis and compute the dimension of a given finite dimensional vector space.
3. Use matrix representation of linear transformations in various computations.
4. Become familiar with the concepts Eigen values and Eigen vectors, minimal polynomials, linear transformations etc.
5. Learn properties of inner product spaces and determine orthogonality in inner product spaces.
6. Prove various statements in the context of vectors spaces.
7. Realize importance of adjoint of a linear transformation and its canonical form.
8. Apply the techniques of diagonalization in solving various problems related to matrices.

Unit – I: Vector spaces

Vector spaces - Definition, Examples and properties, Subspaces - Examples, Criterion for a sub- set to be a subspace and some properties. Linear Combination - Linear span, Linear dependence and Linear independence, Basic properties of linear dependence and independence, Techniques of determining linear dependence and independence in various vector spaces and related problems. Basis and dimension - Co-ordinates, Ordered basis, Some basic properties of basis and dimension and subspace spanned by given set of vectors, Quotient space, Dimension of quotient space (derivation in finite case). Sum and Direct sum of subspaces - Dimensions of sum and direct sum spaces (derivation in finite case).

15 Hours

Unit – II: Linear Transformations

Linear transformation - Definition, Examples, Equivalent criteria, Some basic properties, Matrix representation, Change of basis and effect on associated matrix, Similar matrices; Rank - Nullity theorem - Null space, Range space, Proof of rank nullity theorem and related problems.

15 Hours

Unit – III: Isomorphism, Eigenvalues and Diagonalization

Homomorphism, Isomorphism and automorphism - Examples, Order of automorphism and Fundamental theorem of homomorphism; Eigenvalues and Eigen vectors - Computation of eigen values, Algebraic multiplicity and some basic properties of eigen values, Determination of eigenvectors and eigen space and geometric multiplicity. Diagonalizability of linear transformation - Meaning, Condition based on algebraic and geometric multiplicity and related problems.

15 Hours

Unit – IV: Invertible Transformation and Inner product spaces

Invertible transformation - Some basic properties of invertible, singular and non-singular transformations, Conditions for existence of inverses, Minimal polynomial of a transformation**,** Relation between characteristic and minimal polynomials and related problems.

Inner product and normed linear spaces - Definitions, Examples, Cauchy-Schwartz inequality and related problems; Gram-Schmidt orthogonalization - Orthogonal vectors, orthonormal basis, Gram-Schmidt orthogonalization process.

15 Hours

Reference Books:

[1] I. N. Herstein, *Topics in Algebra*, 2nd Edition, Wiley.

[2] Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003), Linear Algebra(4^{th} Edition), Printice-Hall of India Pvt. Ltd.

[3] F. M. Stewart, *Introduction to Linear Algebra*, Dover Publications.

[4] S. Kumaresan, *Linear Algebra*, Prentice Hall India Learning Private Limited.

[5] Kenneth Hoffman & Ray Kunze (2015), Linear Algebra, (2^{nd} Edition), PrenticeHall India Leaning Private Limited.

[6] Gilbert Strang (2015), Linear Algebra and its applications, (2^{nd} Edition), Elsevier.

[7] Vivek Sahai & Vikas Bist (2013), Linear Algebra (2^{nd} Edition) Narosa Publishing.

[8] Serge Lang (2005), Introduction to Linear Algebra (2^{nd} Edition), Springer India.

[9] T. K. Manicavasagam Pillai and K S Narayanan, Modern Algebra Volume 2.

MATDSCP 6.1: Practicals on Linear Algebra	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 60 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problem on Linear Algebra studied in MATDSCT 6.1 by using FOSS softwares.
3. Acquire knowledge of applications of Linear Algebra through FOSS.

Practical/Lab Work to be performed in Computer Lab (FOSS) Suggested Softwares: Maxima/Scilab /Python/R.

Suggested Programs:

1. Program to verify linear dependence and independence.
2. Program to find basis and dimension of the subspaces.
3. Program to verify if a function is linear transformation or not.
4. Program to find the matrix of linear transformation.
5. Program to illustrate the effect of change of basis on the matrix of linear transformation.
6. Program to check invertibility of the given linear transformation and finding the inverse if exists.
7. Program to find the Eigen values and Eigen vectors of a given linear transformation.
8. Program on Rank – nullity theorem.
9. Program to find the characteristic polynomial of given transformation.
10. Program to find the minimal polynomial of given transformation.
11. Program to find the algebraic multiplicity of the Eigen values of the given linear transformation.
12. Program on diagonalization.
13. Program to verify that the given basis is orthogonal or not.
14. Program to illustrate Gram-Schmidt orthogonalization process.

MATDSCT 6.2: Numerical Analysis	
Teaching Hours : 4 Hours/Week	**Credits: 4**
Total Teaching Hours: 60 Hours	**Max. Marks: 100 (S.A.-60 + I.A. – 40)**

Course Learning Outcomes:

The overall expectation from this course is that the student will get equipped with certain numerical techniques for various computations such as finding roots, finding the integrals and derivatives, and finding solutions to differential equations. Some broader course outcomes are listed as follows. At the end of this course, the student will be able to

1. Compute approximate roots of algebraic and transcendental equations using iterations.
2. Describe various operators arising in numerical analysis such as difference operators, shift operators and so on.
3. Articulate the rationale behind various techniques of numerical analysis such as in finding roots, integrals and derivatives.
4. Reproduce the existing algorithms for various tasks as mentioned previously in numerical analysis.
5. Apply the rules of calculus and other areas of mathematics in justifying the techniques of numerical analysis.
6. Solve problems using suitable numerical technique.
7. Obtain approximate solutions to initial value problems using various numerical techniques.
8. Appreciate the profound applicability of techniques of numerical analysis in solving real life problems and also appreciate the way the techniques are modifiedto improve the accuracy.

Unit – I: Algebraic and Transcendental Equations

Solutions to algebraic and transcendental equations -Bisection method, Regula-Falsi method, Iterative methods, Newton-Raphson method and Secant method (Plain discussion of the rationale behind techniques and problems on their applications).

System of Linear Algebraic Equations: Direct Methods – Gauss elimination method, Gauss-Jordan elimination method and Tringularization method; Iterative methods – Jacobi method, Gauss-Jacobi method, Gauss- Seidal method.

15 Hours

Unit – II: Polynomial Interpolations

Finite differences - Forward, Backward differences and shift operators: definitions, properties and problems; Polynomial interpolation - Newton-Gregory forward and backward interpolation formulas, Gauss's Forward and backward interpolation formulas, Lagrange interpolation polynomial, Newton's divided differences and Newton's general interpolation formula (Discussion on setting up the polynomials and problems on their applications).

15 Hours

Unit-III: Numerical Differentiation and Integration

Formula for derivatives (till second order) based on Newton-Gregory forward and backward interpolations (Derivations and problems based on them). Numerical Integration - General quadrature formula, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule (derivations for only general quadrature formula, trapezoidal rule and Simpson's $1/3^{rd}$ rule and problems on the applications of all formulas).

15 Hours

UNIT-IV: Numerical Solution of Ordinary Differential Equations

Introduction, Solution by Taylor's series method, Picard's method, Euler's method, Modified Euler's method, Runge-Kutta Methods, Predictor-Corrector Methods- Milne's method, Adam's Bashforth Method, Adam Moulton Method.

15 Hours

Reference Books :

1. S. S. Sastry, *Introductory methods of Numerical Analysis*, 5th Edition, PHI Learning Private Limited.
2. E. Isaacson and H. B. Keller, *Analysis of Numerical methods*, Dover Publications.
3. E Kreyszig, *Advanced Engineering Mathematics*, Wiley India Pvt. Limited.
4. B. S. Grewal, *Numerical Methods for Scientists and Engineers*, Khanna Publishers.
5. M. K. Jain, S. R. K. Iyengar and R. K. Jain, *Numerical Methods for Scientific and Engineering computation*, 4th Edition, New Age International
6. H. C. Saxena, *Finite Difference and Numerical Analysis,* S. Chand Publishers
7. B. D. Gupta, *Numerical Analysis*, Konark Publishers Pvt. Ltd.

MATDSCP 6.2: Practicals on Numerical Analysis	
Practical Hours : 4 Hours/Week	**Credits: 2**
Total Practical Hours: 60 Hours	**Max. Marks: 50 (S.A.-25 + I.A. – 25)**

Course Learning Outcomes: This course will enable the students to

1. Learn *Free and Open Source Software (FOSS)* tools for computer programming
2. Solve problem on numerical Analysis studied in **MATDSCT 6.2 by** using FOSS softwares.
3. Acquire knowledge of applications of Numerical Analysis through FOSS.

Practical/Lab Work to be performed in Computer Lab (FOSS)

Suggested Softwares: Maxima/Scilab /Python/R.

Suggested Programs:

1. Program to find root of an equation using Bisection, Regula-Falsi and Secant methods.
2. Program to find root of an equation using Newton-Raphson method.
3. Program to solve system of algebraic equations using Gauss-elimination method.
4. Program to solve system of algebraic equations using Gauss-Jordan method.
5. Program to solve system of algebraic equation using Gauss-Jacobi method.
6. Program to solve system of algebraic equation using Gauss-Seidel method.
7. Program to evaluate integral using Simpson's 1/3 and 3/8 rules.
8. Program to evaluate integral using Trapezoidal and Weddle rules
9. Program to find the sums of powers of successive natural numbers using Newton – Gregory technique.
10. Program to find differentiation at specified point using Newton-Gregory interpolation method.
11. Program to find the missing value of table using Lagrange method.
12. Program to find the solution of given initial value problem using Picard's method.
13. Program to find the solution of given initial value problem using Euler's method and Modified Euler's method.
14. Program to find the solution of given initial value problem using Runge-Kutta methods.

References

1. The Hundred-Page Machine Learning Book, Andriy Burkov, January 13, 2019.
2. Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition by Andreas Müller, Sarah Guido, O'Reilly Media, November 15, 2016

List of Activities:

1. Introduction to Scikit, Numpy, Scipy and Tensor Flow
2. Linear Regression – Single Variable Linear Regression
3. Linear Regression – Multi Variable Linear Regression
4. Classification – Logistic Regression
5. Classification – Support Vector Machines (SVM)
6. Classification using Neural Networks
7. Unsupervised Learning – Principal Component Analysis (PCA)
8. Unsupervised Learning – K-Means Clustering

MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BSC-COMPUTER SCIENCE

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programmes

Bachelor of Science-B.Sc.

Semester	Course 1	Course 2	Course 3	Elective / Optional	Language	Compulsory	Total Credit	Total Working hours
I	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)		3+3	2	23	4+4+4+4+4+4+4+4+4+2=34
II	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)		3+3	2	23	4+4+4+4+4+4+4+4+4+2=34
III	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2	3+3		23	4+4+4+4+4+4+4+4+4+2=34
IV	5 (3T+2P)	5 (3T+2P)	5 (3T+2P)	2	3+3	2	25	4+4+4+4+4+4+4+4+2+2=36
V	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]			2	26	3+3+4+3+3+4+3+3+4+2=32
VI	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]			2	26	3+3+4+3+3+4+3+3+4+2=32
							146	**202**

Note:

- **Course1, Course2 and Course3: I to IV Semester: Theory 3 credits = 4 contact hours & Practical 2 credit = 4 contact hours**
- **Course1, Course2 and Course3: V and VI Semester: 3 credits = 3 contact hours & Practical 2 credit = 4 contact hours**
- **Elective/Optional: 2 credits = 2 contact hours**
- **Languages: 3 credits = 4 contact hours**
- **Compulsory: 2 credits = 2 contact hours**

CURRICULUM STRUCTURE FOR I TO VI SEMETER BSC-COMPUTER SCIENCE

Semester I								
Sl No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSC-CSC-1.1**	Computer Fundamentals and Programming in C	**Core**	**4**	**80**	**20**	**100**	**3**
2	**BSC-CSC-1.2**	C Programming-Lab	**Practical**	**4**	**40**	**10**	**50**	**2**

Semester II								
Sl No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSC-CSC-2.1**	Data Structures	**Core**	**4**	**80**	**20**	**100**	**3**
2	**BSC-CSC-2.2**	Data Structures Lab	**Practical**	**4**	**40**	**10**	**50**	**2**

Semester III								
Sl No	**Course Code**	**Title of the Cours*e***	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSCCSCS301**	Object Oriented Programming using Java	**Core**	**4**	**80**	**20**	**100**	**3**
2	**BSCCSPS301**	Object Oriented Programming Lab using Java	**Practical**	**4**	**40**	**10**	**50**	**2**
2	**BSCCSES301**	A. Digital Marketing B. Web Content Management C. Computer Organization	**Elective**	**2**	**40**	**10**	**50**	**2**

Semester IV								
Sl No	**Course Code**	**Title of the Cours*e***	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSC-CSC-4.1**	Database Management System	**Core**	**4**	**80**	**20**	**100**	**3**
2	**BSC-CSC-4.2**	DBMS-Lab	**Practical**	**4**	**40**	**10**	**50**	**2**
3	**BSC-CSC-4.3**	A) Cloud Computing B) WEB design Basics C) Cyber Security	**Elective**	**2**	**40**	**10**	**50**	**2**
4	**BSC-CSC-4.4**	Data Analytics using Excel	**Compulsory**	**2**	**40**	**10**	**50**	**2**

Semester V								
Sl No	**Course Code**	**Title of the Cours*e***	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSC-CSC-5.1**	Programming in Python	**Core**	**3**	**80**	**20**	**100**	**3**
2	**BSC-CSC-5.2**	Operating Systems	**Core**	**3**	**80**	**20**	**100**	**3**
3	**BSC-CSC-5.3**	Python and Linux - Lab	**Practical**	**4**	**80**	**20**	**100**	**2**
4	**BSC-CSC-5.4**	Artificial Intelligence	**Compulsory**	**2**	**40**	**10**	**50**	**2**

Semester VI								
Sl No	**Course Code**	**Title of the Cours*e***	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BSC-CSC-6.1**	Statistical Computing and R Programming	**Core**	**3**	**80**	**20**	**100**	**3**
2	**BSC-CSC-6.2**	Web Technologies	**Core**	**3**	**80**	**20**	**100**	**3**
3	**BSC-CSC-6.3**	R Programming and Web Technologies Lab	**Practical**	**4**	**80**	**20**	**100**	**2**
4	**BSC-CSC-6.4**	Computer Hardware and Maintenance	**Compulsory**	**2**	**40**	**10**	**50**	**2**

SEMESTER III

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**III**
Course Title	**Object Oriented Programming using Java** (Theory)		
Course Code:	**BSCCSCS301**	No. of Credits	**03**
Contact hours	**4 Hours per week**	Duration of Exam/SEE	**3 hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the features of Java and the architecture of JVM
- Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done
- Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- Demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Languages
- Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

			Number of hours/Unit – 13
Unit	**Description**	Book	Chapter
1	**Introduction to Java:** Basics features of Java programming, Java program structure, Implementing Java program, Java virtual machine, Constants, variables, Data types, declaring and assigning value to thevariables, Operators, Control structures (including if, switch, and ternary operator), Looping.	Book - 1	Chapter 2- 2.1, 2.2[pg.10 –13] Chapter 3- 3.5, 3.9, 3.10 Chapter 4 – 4.2, 4.3, 4.4, 4.5, 4.6 Chapter 5- 5.1 to 5.14 Chapter 6, Chapter 7
2	**Objects and Classes:** Basics of objects and classes in java, Methods and objects, Constructors, methods Overloading, Finalised, Visibility modifiers, Arrays in java, Inbuilt classes like Math, String, Character, String Buffer and their methods, this reference. **Inheritance and Polymorphism:** Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Abstract methods and classes, Interface in Java, Package in Java, UTIL package.	Book - 1 Book - 2 Book - 1	Chapter 8 - 8.1 to 8.8, 8.15, 8.11, 8.12, 8.18, Chapter 9 - 9.1 to 9.4 Chapter 5- 5.15 Book 2- Chapter 15, Pg. 120 Book 1- Chapter 5- 5.13 8.11 to 8.12, 8.16-8.17 Chapter 10 - Complete Chapter 11- 11.1 to 11.9
3	**Event and GUI programming:** Event handling in Java, Event types, Mouse andkey events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, BorderLayout, Grid Layout, GUI components like Buttons, CheckBoxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Menus, Dialog Box, **Exception handling** with try catch-finally.	Book 2 Book 1	Chapter 22- Pg. 637 – 639, 645, 646 Chapter 23- 666-667 Chapter 24- Pg. 701 -729,737 - 746 Chapter 14- Complete Chapter 15- 15.11 Chapter 13- 13.1 to 13.3
4	**I/O programming:** Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. **Multithreading in Java**: Thread life cycle and methods, Runnable interface, Thread synchronization. Applet and its life cycle, Introduction to	Book 1	Chapter 16 – 16.1 to 16.17 Chapter 12- 12.1 to 12.10 Chapter 13- 13.4 to 13.6 Chapter 17- complete

	swing. **Java Database Connectivity:** JDBC Driver Types, JDBC Packages, Overview of the JDBC process, Database Connection.		Chapter 20 Chapter 27- Pg. 837 – 840 Study Material for JDBC

Text Books:

1. Programming with Java, E Balagurusamy – A Primer, 4th Edition, McGraw Hill Publication.
2. Java - The Complete Reference, Herbert Schildt, 7th Edition, McGraw Hill Publication, 2017

References:

1. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
2. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**III**
Course Title	**Java Programming Lab**		
Course Code:	**BSCCSPS301**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of Exam/SEE	**3hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Java Programming Lab

List of programs

PART-A

1. Program to print all Fibonacci numbers between the range. (Use for loop)
2. Program which reads two numbers having same number of digits. The program should output the sum of product of corresponding digits. (Hint Input 327 and 539 output 3x5+2x3+7x9=84)
3. Program to find the biggest and smallest number in 3 x 3 array. The program should receive the 9 integers as command line arguments.
4. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.

   Dearness Allowance = 15% of salary
   House Rent Allowance = 10% of salary
   Provident Fund = 12% of salary
   Gross Salary = Salary + Dearness Allowance + House Rent Allowance
   Net Salary = Gross Salary - Provident Fund

   Write a main method to create object of the class and call the methods to compute and display the salary details. [class basics]

5. Given two strings, a and b, print a new string which is made of the following combination- first character of a, the first character of b, second character of a, second character of b and

so on. Any characters left, will go to the end of the result.

Example:

Input: Hello,World Output: :HWeolrllod

6. Write a Program to take care of Number Format Exception if user enters values othert than integer for calculating average marks of n students.
   The name of the students and marks in 3 subjects are taken from the user while executing the program.
   In the same Program write your own Exception classes to take care of Negative values and values out of range (i.e. other than in the range of 0-100)

7. Create a package to calculate volume of cube, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application

PART-B

1. Create a school application with a class called Person. Create name and dateOfBirth as member variables.
   Create a class called Teacher that inherits from the Person class. The teacher will have additional properties like department, and the subject that the teacher teaches.
   Create a class called Salary that inherits from the Teacher class. The Salary will have additional properties like basic. And method to calculate the DA, HRA, PF, IT, GROSS and NETPAY using appropriate condition.
   If Basic <= 20000 D.A is 40% Basic H.R.A is 10% Basic.
   P.F 12% of Gross; PT is Rs .100
   If Basic.> 20000 D.A is 50% Basic. H.R.A 15% Basic.
   P.F 12% of Gross ; PT is Rs.150
   Gross = Basic.+D.A +HRA and Net = Gross -PT –PF
   Create a class called Student that inherits from Person class. This class will have a member variable called studentId.
   Create a class called College Student that inherits from Student class. This class will have collegeName, the year in which the student is studying (first/second/third/fourth)etc.
   Create objects of each of these classes, invoke and test the methods that are available in these classes.

2. Write a program that implements a multi-threaded program has three threads. First thread generates a random integer every second, and if the value is even, second thread computesthe square of the number and prints. If the value is odd the third thread will print the value of cube of the number. [Multithreading]

3. Write a program to separate odd and even numbers from the file NUMBER.txt and placed in two files OOD.txt and EVEN.txt. Write the numbers along with its corresponding count in an output file.

4. Write a Program to calculate marks of a student using multiple inheritance implemented through interface. Class Student with data membersrollNo, name, String cls and methods to set and put

data. Create another class test extended by class Student with data membersmark1, mark2, mark3 and methods to set and put data. Create interface sports with members sportsWt = 5 and putWt(). Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.

5. Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application.

6. Program that creates a user interface to perform basic integer operations.
The user enters two numbers in the TextFields - Num1 and Num2. The result of operations must be displayed in the Result TextField when the "=" button is clicked. Appropriate Exception handling message to be displayed in the Result TextFieldwhen Num1 or Num2 is not an integer or Num2 is Zero when division operation is applied.

7. Write a JDBC program to create a Bank database with fields Acc_no, Acc_name, Balance. Perform these operations
a) Insert the Account Holder information from the keyboard.
b) Amount Deposited
c) Amount Withdraw (Maintain minimum balance 500 Rs).
Display all information.(Use proper validation).

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing: 7 Marks** **Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing: 10 Marks** **Execution: 10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**III**
Course Title	**Digital Marketing (Elective)**		
Course Code:	**BSCCSES301**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the fundamental concepts and principles of digital marketing.
- Develop practical skills to implement various digital marketing strategies and techniques
- Analyze and evaluate the effectiveness of digital marketing campaigns.
- Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.
- Create comprehensive digital marketing plans and strategies

Unit	Description	Hours
1	**Introduction to Digital Marketing:** Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms Digital Marketing Strategy and Planning: Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns	8

2	**Social Media Marketing:** Overview of social media marketing, social media platforms and their features, Creating and optimizing social media profiles, social media content strategy, social media advertising and analytics **Email Marketing**: Introduction to email marketing, building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics	8
3	**Mobile Marketing:** Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics **Analytics and Reporting:** Importance of analytics in digital marketing, setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	10

Text Books:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.

References

1. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White
2. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi
3. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles
4. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**III**
Course Title	**Web Content Management. (Elective)**		
Course Code:	**BSCCSES302**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand content development basics.
- Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting.
- Host websites and develop content for social media platforms such as wiki and blog
- Understand e-publications and virtual reality
- Understand the e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	Web Content Development and Management, Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing.	**8**
2	Web Hosting and Managing Multimedia Content, Creating and Maintaining a Wiki Site. Presentation Software Part , Screen casting Tools and Techniques, Multilingual Content Development.	**8**
3	Planning and Developing Dynamic Web Content Sites, Website Design Using CSS Creating and Maintaining a WIKI Site, Creating and Managing a Blog Site. Content Management System: Joomla, Content Management System: Drupal	**10**

Text Book:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.

Reference Books:

1. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
2. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**III**
Course Title	**Computer Organization. (Elective)**		
Course Code:	**BSCCSES303**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Boolean algebra concepts, various design Components of Computer System like logical gates and combinational circuits.
- Understand Digital computer and digital systems functioning

Unit	Description	Hours
1	**Digital Computers and Digital System**: Introduction to Number System, Decimal number, Binary number, Octal and Hexadecimal numbers, Number base conversion, Complements, Binary codes, Binary arithmetic, Addition, Subtraction in the 1's and 2's complements system, Subtraction in the 9's and 10's complement system.	**8**
2	**Boolean Algebra:** Basic definitions, Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra, Venn diagram. **Digital logical gate:** Boolean functions, Canonical and Standard forms, Minterms, Maxterms, other logic operations, Digital logic gates, Universal gates.	**8**
3	**Simplification of Boolean function:** The map method, Two and three variable maps, four variable maps, Don't care conditions, Product of sum simplification. **Combinational Logic**: Introduction, Design Procedure, Half adder, Full adder, half Subtractor, Full Subtractor	**10**

Text Books:

1. M. Morris Mano, Digital Logic and Computer design, PHI, 2015

References

1. Thomas L Floyd, Digital Fundamentals, 10th Edition, Pearson, 2011.
2. Thomas. C. Bartee, Digital Computer Fundamentals, 6th edition, TMH

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

SEMESTER IV

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**Database Management System (Theory)**		
Course Code:	BSCCSCS401	No. of Credits	**03**
Contact hours	**52 Hours**	Duration of Exam/SEE	**3hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and design ER diagrams for given real-world problems.
- Represent ER model to relational model and its implementation through SQL.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

Unit	Description	Hours
1	**Database Architecture**: Introduction to Database system applications. Characteristics, Data models, Database schema, Database architecture, Data independence, Database languages, GUIs, and Classification of DBMS. **E-R Model**: E-R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship	**13**

	types, Roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.	
2	**Relational Data Model**: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. **Data Normalization**: Functional dependencies. Normalization. First normal form, second normal form, Third normal form. Boyce-Codd normal form.	**13**
3	**INTERACTIVE SQL**: Table fundaments, oracle data types, CREATE TABLE command, inserting data into table, Viewing Data in the table, sorting data in a table, creating a table from a table, inserting data into a table from another table, delete operations, Updating the contents of a table, Modifying the structure of tables, renaming tables, destroying tables, displaying table structure. **DATA CONSTRAINTS**: Types of data constraints, IO constraints-The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints- NULL value concepts, NOT NULL constraints, CHECK constraint, DEFAULT VALUE concepts. **COMPUTATIONS ON TABLE DATA**: Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function- Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL, Group By clause, Having clause, subqueries, JOINS, Using the UNION, INTERSECTION, MINUS clause	**13**
4	**INTRODUCTION TO PL/SQL**: Advantages of PL/SQL, The Generic PL/SQL Block, PL/SQL The character set, Literals, PL/SQL datatypes, variables, Logical comparisons, Displaying User Messages on The VDU Screen, comments. Control Structure - Conditional Control, Iterative Control **PL/SQL Transactions**: Cursor-Types of Cursors, Cursor Attributes. Explicit cursor- Explicit cursor Management, cursor for loop. **PL/SQL Database Objects**: Procedures and Functions, Oracle Packages, Database Triggers, Error Handling in PL/SQL.	**13**

Text Book:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015

Reference Books:

1. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
2. Introduction to Database System, C J Date, Pearson, 1999.
3. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
4. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**DBMS Lab**		
Course Code:	**BSCCSPS401**	No.of Credits	**02**
Contact hours	**52**	Duration of Exam/SEE	**3 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

DBMS Lab
List of Programs

PART-A

1.Create a table EMPLOYEE using SQL command to store details of employees such as EMPNO, NAME, DESIGNATION, DEPARTMENT, GENDER and SALARY. Specify Primary Key and NOT NULL constraints on the table.

Allow only 'M' or 'F' for the column GENDER.

DEPARTMENT can be SALES, ACCOUNTS, IT.

Choose DESIGNATION as CLERK, ANALYST, MANAGER, ACCOUNTANT and SUPERVISOR that depends on department

Write the following SQL queries:

a) Display *EMPNO, NAME* and *DESIGNATION* of all employees whose name ends with RAJ.
b) Display the details of all female employees who is earning salary within the range 20000 to 40000 in SALES or IT departments
c) List the different DEPARTMENTs with the DESIGNATIONs in that department.
d) Display the department name, total, average, maximum, minimum salary of the DEPARTMENT only if the total salary given in that department is more than 30000.
e) List the departments which have more than 2 employees.

2. Create a table CLIENT to store CLIENT_NO, NAME, ADDRESS, STATE, BAL_DUE. Client no must start with 'C'. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records.

Write the following SQL queries:

a) From the table CLIENT, create a new table CLIENT1 that contains only CLIENT_NO and NAME , BAL_DUE from specified STATE. Accept the state during run time.
b) create a new table CLIENT2 that has the same structure as CLIENT but with no records. Display the structure and records.

c) Add a new column by name PENALTY number (10, 2) to the CLIENT

d) Assign Penalty as 10% of BAL_DUE for the clients C1002, C1005, C1009 and for others 8%. Display Records

e) Change the name of CLIENT1 as NEW_CLIENT

f) Delete the table CLIENT2

3. Create a table BOOK using SQL command to store Accession No, TITLE, AUTHOR, PUBLISHER, YEAR, PRICE. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records.

Write the following SQL queries:

a) List the details of publishers having 'a' as the second character in their names.

b) Display Accession No., TITLE, PUBLISHER and YEAR of the books published by the specified author before 2010 in the descending order of YEAR. Accept author during run time

c) Modify the size of TITLE to increase the size 5 characters more.

d) Display the details of all books other than Microsoft press publishers.

e) Remove the records of the books published before 1990.

4. Create a table SALES with columns SNO, SNAME, MNO , JOIN_DATE, DATE_BIRTH, SALARY,SALES_AMOUNT and COMMISSION. Minimum age for joining the company must be 18 Yrs. Default value for Commission should be 0. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records with data except commission. Manager of Manager can be NULL.

Write the following SQL queries:

a) Display the details of Sales Persons whose salary is more than Average salary in the company.

b) Update commission as 20% of Sales Amount.

c) Display SNO, SNAME, MNO, SALARY, COMMISSION, MANAGER_SALARY of the sales persons getting sum of salary and commission more than salary of manager. (Self-join)

d) Display the records of employees who finished the service of 10years

5. Create a table Sales_Details with the columns SNO, MONTH, TARGET and QTY_SOLD to store the Sales Details of one year. Specify the composite primary key to the columns SNO and MONTH. TARGET and SALES must be positive numbers.

Write the following SQL queries:

a) Display the total sales by each sales person considering only those months sales where target was reached

b) If a commission of RS.50 provided for each item after reaching target, calculate and display the total commission for each sales person.

c) Display the SNO of those who never reached the target.

d) Display the SNO, MONTH and QTY_SOLD of the sales persons with SNO S0001 or S0003

6. Create the following tables by identifying primary and foreign keys. Specify the not null property for mandatory keys. SUPPLIERS (SUPPLIER_NO, SNAME, SADDRESS, SCITY) COMPUTER_ITEMS (ITEM_NO, SUPPLIER_NO, ITEM_NAME, IQUANTITY) Consider three suppliers. A supplier can supply more than one type of items.
   Write the SQL queries for the following:
   a.)List ITEM and SUPPLIER details in alphabetical order of city name and in each city decreasing order of IQUANTITY.
   b)List the name , city and address of the suppliers who are supplying keyboard.
   c.) List the supplier name, items supplied by the suppliers 'Cats' and 'Electrotech'.
   d.)Find the items having quantity less than 5 and insert the details of supplier and item into another table NEWORDER

7. Create the following tables identifying Primary and Foreign keys. Specify the not null property for mandatory keys. EMPLOYEE_MASTER (EMP_ID, EMP_NAME, EMAIL_ID, EMP_ADDRS, PHONE) ATTENDANCE (EMP_ID, MONTH, WOM, MHRS, THRS, WHRS, TRHRS, FHRS, SHRS, SUHRS). (Valid values for WOM<=5, MONTH can be 1-12). Apply appropriate constraints. Consider 3 employees. And attendance records for at least two months. Write the SQL queries for the following:

a) Display EMP_ID,EMP_NAME and EMAIL_ID of all employees who are working on every Sunday of 2nd and 4th week in a month.

b) Display total hours worked by each employee in each month with EMP_ID.

c) Display the names of the employees who never attended the duty so far(Attendances not given so far).

d) Display the employee's name, month, week, total hours worked for employees who have total no. of hours more than 20 hrs a week.

PART-B

8. Write a PL/SQL program to accept the students rollno, name and their marks in 3 subjects from a base table Student (having RollNo, Sname, Marks in three subjects) and declare the result based on the following rules:
   i). If student has scored below 35 in any subject he/she is declared as FAIL.
   ii). If the Total >=180 then declare the result as I CLASS
   iii). If the Total >=150 but <180 then declare the result as II CLASS
   iv). If the Total <120 the declare the result as III CLASS.
   Assume the records of 5 students. Create an output which contains the roll number, name of the student, marks in 3 subjects, total mark and result in the following format.
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ROLLNO NAME MARK1 MARK2 MARK3 TOTAL RESULT

==========

9. Create a table Bank with the columns ACNO, ACT_NAME, ACT_TYPE and BAL. Specify the Primary Key. Initial BAL must be greater than 500.

   Write a PL/SQL program to perform debit operation by providing acct_no and amount required. The amount must be greater than 100 and less than 20000 for one transaction. If the account exist and BAL-amount>500 Bank table must be updated, otherwise "NO SUFFFICIENT BALANCE" message should be displayed. If account number is not present then display "NO SUCH ACCOUNT" message to the user.

10. Write a PL/SQL program to compute the selling price of books depending on the book code and category. Use Open, Fetch and Close. The Book_detail table contains columns: Book Code, Author, Title, Category and Price. Insert 10 records. The selling price=Price-Discount.

    The discount is calculated as follows:

Book Code	Category	Discount Percentage
A	Novels	10% of Price
	Technology	12.5% of Price
B	Commerce	18% of Price
	Science	19% of Price
C	Songs	25% of Price
	Sports	24% of Price
D	All	28% of Price

Print the result in tabular form with proper alignment

Book Code category title author price discount% discountamount sell price

11. Write a PL/SQL program to display employee pay bill (using Cursor For loop) Use a Procedure to receive basic pay and to compute DA, HRA, Tax, PF, Gross Pay and Net Pay(Use OUT). Base table contains the following columns empnum, empname, basic pay. Insert 3 records. Allowances are computed as follows.

Basic Pay	DA	HRA
<=20000	35% of Basic	8% of Basic
>20000 & <=30000	38%	9%
>30000 & <=40000	40%	10%
>40000	45%	10%

Gross=Basic+DA+HRA

PF=12% of Gross or Rs. 2000 whichever is minimum.

PT=Rs. 100 upto Gross is 25,000 else Rs. 200.

Net=Gross-(PF+PT)

Print Pay slip as follows

```
==================PAYSLIP====================
Empno              :10011          Empname : Raj
Basic Pay          :20000             P.F.: 3432
DA                 :7000            P.T.: 200
H.R.A.             :1600
Gross              :28600        Net Pay : 24968
*************************************************
==================PAYSLIP====================
Empno              :10012          Empname : Rani
Basic Pay          :30000             P.F.: 5292
DA                 :11400             P.T.: 200
H.R.A.             :2700
Gross              :44100        Net Pay : 38608
*************************************************
```

12. Given the following tables

ITEM_MASTER (Item_No,Item_Name, Stock, Unit_Price)

ITEM_TRANS (Item_No,Qty, Trans_Date)

Write a function to check whether the item exists in ITEM_MASTER. Write a main program such that if the function returns a value 1, add a record to ITEM_TRANS with a given Item_No, Qty and today's date as Trans_Date, otherwise display an appropriate error message.

13. Create a trigger to update the MASTER table when a record is inserted into SALES table and create another trigger to update the MASTER table when a record is inserted or updated or deleted in NEWSTOCK table. Assume the suitable columns for all the tables.

14. Create a package which includes a function to compute the factorial of a number, a procedure to compute the value of nCr, and another procedure to compute nPr both uses the factorial function. Execute the package program for the required calculation.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8 Marks**	**15 Marks**
Program-2	**PART-B**	**20 Marks**

	Writing:10 Marks Execution:10 Marks	
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**WEB design Basics (ELECTIVE)**		
Course Code:	**BSCCSEC401**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the fundamentals of HTML5 and its evolution from previous versions.
- Identify the structure and components of an HTML5 document.
- Utilize HTML5 semantic elements to create well-structured web pages.
- Implement multimedia elements such as audio and video using HTML5.
- Demonstrate the use of HTML5 forms and input types for user data collection.
- Apply best practices for web accessibility and SEO in HTML5 documents.

Unit	Description	Hours
1	Introduction to Computers and the Internet-Introduction, The Internet in Industry and Research, Evolution of the Internet and World Wide Web, Web Basics. Introduction to HTML5: Introduction, Editing HTML5, First HTML5 Example, W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta-Elements.	**8**

	New HTML5 Form input Types, input and data list Elements and autocomplete Attribute, Page-Structure Elements.	
2	Cascading Style Sheets-Introducing CSS, Add CSS Rules, CSS Properties-Controlling Fonts, Text Formatting, Text Pseudo-Classes, Selectors, Lengths, and Percentages.	**8**
3	More Cascading Style Sheets: Links, Backgrounds, Lists, Tables, Outlines, The: focus and: active Pseudo-Classes.	**10**

Text Books:

1.Deitel, Paul_Deitel, Harvey_Deitel, Abbey - Internet and World Wide Web How to Program-Pearson Education (US) (2011)

2.Jon Duckett -Beginning Web Programming with HTML, XHTML, and CSS (Wrox Beginning Guides)-Wrox (2004)

References:

1.The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell,
2017.
2.Animation in HTML, CSS, and JavaScript, KirupaChinnathambi, 1st Edition,
Createspace Independent Pub, 2013
3.Web Programming with HTML5, CSS, and JavaScript-John Dean

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**Cyber Security (ELECTIVE)**		
Course Code:	**BSCCSES402**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the concept of Cyber security and issues and challenges associated with it.
- Understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- Appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.
- On completion of this course, students should be able to appreciate various privacy and security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.

Module	Description	Hours
1	**INTRODUCTION TO CYBERCRIME**: Cybercrime - Definition and Origins of the Word, Cybercrime and Information Security, Who are Cyber criminals? Classifications of Cyber Crimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens, Cyber Offences: How Criminals Plan Them, How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cyber cafe and Cybercrimes. Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing. Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices.	**8**

2	Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones. Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era. Tools and methods used in cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft).	**10**
3	Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.	**8**

Text Books:

1. SunitBelapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes,
2. ComputerForensicsAndLegalPerspectives",WileyIndiaPvtLtd,ISBN:978-81-265-21791, Publish Date 2013.
3. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, KLSI.
4. "Introduction to information security and cyber laws". DreamtechPress. ISBN: 9789351194736, 2015.
5. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing, andInvestigatingIntrusions", Copyright © 2014 by John Wiley & Sons, Inc

References

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by SumitBelapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
2. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001
3. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd
4. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
5. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.

6. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**Cloud Computing (Elective)**		
Course Code:	**BSCCSES403**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

- Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in data centers to understand the trade-offs in power, efficiency and cost.
- Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit	Description	Hours
1	**Introduction:** Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantages and Disadvantages, and Applications of Cloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**8**
2	**Cloud Architecture:** Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization.	**8**
3	**Cloud Application Programming and the Aneka Platform:** Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container; Building Aneka Clouds (Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode); Cloud Programming and Management- Aneka SDK (Application Model and Service Model); Management Tools (Infrastructure, Platform and Application management).	**10**

Text Books:

1.Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering Cloud Computing- Foundations and Applications Programming", Elsevier, 2013

References Books:

1. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
2. K Chandrashekaran: "Essentials of Cloud Computing", CRC Press, 2015

4 Derrick Rountree, Ileana Castrillo: "The Basics of Cloud Computing", Elsevier, 2014

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**BSC-COMPUTER SCIENCE**	Semester	**IV**
Course Title	**Data Analytics using Excel (Compulsory)**		
Course Code:	**BSCCSES403**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of Exam/SEE	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcome:

After completing this course, a student will be able to:

- Demonstrate data manipulation, analysis, and visualization tasks.
- Create and apply basic and advanced formulas in Excel, including functions
- Develop skills in data analysis techniques such as sorting, filtering, and using PivotTables to summarize and analyze data effectively.
- Utilize Excel tools for tasks such as splitting screens, renaming spreadsheets, and copying and pasting data between spreadsheets.
- Create various types of charts in Excel, and format and customize these charts to effectively present data in real-world scenarios that require strong data analysis and presentation skills.

Unit	Description	Hours
1	**Introduction to Excel:** Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, Formula Bar, Workbook Window, Columns, Rows, Cells, and Formatting. Ranges, Using AutoFill Creating Formulas. **Basic functions** – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum, Advance Formulas Concatenate, Vlookup, Hlookup, Match, Countif.	**8**
2	**Decision Making:** Introduction to IF, nested IF, Introduction to the Data filtering capabilities of Excel, Data Validation, **Data Analysis:** Sorting, Filter, Text to Column, PivotTables Creating PivotTables, manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables Spreadsheet Tools.	**8**
3	**Charts:** Creating Charts, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table **Charts in Excel:** Constructing various Line, Bar, Pie charts, Histograms and Scatter plots. **Multiple Spreadsheets:** Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets	**10**

Text Books:

1. "Data Analysis Using Microsoft Excel: Updated for Office 365" by Michael Alexander and Richard Kusleika.
2. "Data Analysis with Microsoft Excel: Updated for Office 2007" by Kenneth N. Berk and Patrick Carey.

References Books:

"Excel Data Analysis: Modeling and Simulation" by Hector Guerrero

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Questions Paper for Pattern Core Subjects

Duration:3 Hours Max.Marks:80

Note: Answer any ten Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 10*2=20

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

Part-B

UNIT-I, II, III,IV

Each unit contain main questions and it carry 15 Marks.
Each main questions contain 2 or more sub question.

4*15=60

UNIT-I

2.

a.
b.
c.

3.

a.
b.
c.

Questions Paper Pattern for Elective and Compulsory Subjects

Duration:2 Hours Max.Marks:40

Note: Answer any 5 Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 5*2=10

a.
b.
c.
d.
e.
f.
g.
h.

Part-B

UNIT-I, II, III

Each unit contain two main questions and it carry 10 Marks.
Each main questions contain 2 or more sub question.

3*10=30

UNIT-I

2.

a.
b.
c.

3.

a.
b.
c.

MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

III AND IV SEMESTER

BCOM-COMPUTER APPLICATIONS

CURRICULUM STRUCTURE FOR III TO VI SEMESTER BCOM-COMPUTER APPLICATIONS

Semester III								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**Language – I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**Language – II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCom-CAT- 3.1**	**COMMERCE-1**	**Core**	**5**	**80**	**20**	**100**	**5**
4	**BCom-CAT- 3.2**	**COMMERCE-2**	**Core**	**5**	**80**	**20**	**100**	**5**
5	**BCom-CAT- 3.3**	Java Programming	**Core**	**4**	**80**	**20**	**100**	**3**
6	**BCom-CAT-3.4**	Operating System	**Core**	**2**	**40**	**10**	**50**	**2**
7	**BCom-CAP-3.1**	Java Programming	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCom-CAT- 3.5**	Cloud Computing	Compulsory	**2**	**80**	**20**	**100**	**2**
				30			700	**25**

Semester IV								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**Language – I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**Language – II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCom-CAT-4.1**	**COMMERCE-1**	**Core**	**5**	**80**	**20**	**100**	**5**
4	**BCom-CAT-4.1**	**COMMERCE-2**	**Core**	**2**	**40**	**10**	**50**	**2**
5	**BCom-CAT-4.3**	Web Application Development	**Core**	**4**	**80**	**20**	**100**	**3**
6	**BCom-CAT-4.4**	Computerized Accounting	**Core**	**4**	**80**	**20**	**100**	**3**
7	**BCom-CAP-4.1**	Web Application Lab	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCom-CAP-4.1**	Computerized Accounting Lab	**Practical**	**4**	**40**	**10**	**50**	**2**
9	**BCom-CAT-4.5**	**COMMERCE-3**	**Compulsory**	**2**	**40**	**10**	**50**	**2**
				33			700	**25**

Program Name	**B.Com-Computer application**	Semester	**III**
Course Title	**Java Programming**		
Course Code:	**BCMCAVS301**	No.of Credits	**03**
Contact hours	**48 Hours**	Duration of Exam/SEE	**3hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the object-oriented concepts and JAVA Technology
- Present the Java Technology basics including classes, objects, sub-classes, etc.
- Implement Classes and multithreading using JAVA.
- Demonstrate the basic principles of creating Java applications with GUI.

Unit	Description	Hours
1	**Java Evolution:** Java history, Java features, Java support systems, Java environment. **Overview of Java Language:** Introduction, Java program structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments. **Constants, Variables and Data Types:** Introduction, Constants, variables, data types, Declaration of variables, Scope of variables, Standard default values. **Operators:** Introduction, Arithmetic, Relational, Logical, Assignment, Increment & decrement, conditional, Bitwise operators, special operators, Precedence of operators **Expressions:** Arithmetic expressions, Evaluation of expressions, Type conversions in expressions, Operator precedence and associatively, **Mathematical functions.**	**12**
2	**Decision making and branching:** Introduction, Decision making with If statements, simple IF statement, Nesting of IF …….ELSE statements. ELSE…….if…….ladder, switch statement, ?: operator, **Decision making and Looping:** Introduction, while statement, Do statement, For statement, Jumps in Loops, Labeled Loops. **Classes objects and methods:** Introduction, Defining a Class, Adding Variables, Adding methods, Creating Objects, Accessing Class members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance, Overriding Methods, Final variables and Methods, Final	**12**

	classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.	
3	**Arrays:** One dimensional Arrays, Creating an Array, Two Dimensional Arrays, Strings, Vectors, Wrapper Classes. **Interfaces:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Introduction, Java, API Packages, Using System Packages, Naming Conventions, Creating Packages, accessing a Package, using a Package, adding a class to a Package, Hiding classes. **Managing Errors and Exceptions:** Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, throwing our own Exceptions, Using Exceptions for Debugging	**12**
4.	**Input/Output:** The Java I/O Classes and Interfaces, The Stream Classes, The Byte Streams, The Character Streams, Basics of File Programming: Reading from the file and Writing to the file. **Event Handling -** The delegation event model, Event Classes – ActionEvent, KeyEvent & MouseEvent Classes, EventListener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window. **Introducing swing**–two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- Jlabel, JTextField, JButton, Checkboxes, Radio buttons , Jlist , JComboBox.	**12**

Text Books:

1. Programming with Java, By E Balagurusamy – A Primer, 4 th Edition, McGraw Hill Publication.
2. Herbert Schildt, Java -The Complete Reference, Seventh Edition, McGrawHill Publication. 2017
3. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall.
   Ref

References:

1. Object Oriented Programming with Java: Somashekara M.T., Guru, D.S., Manjunatha K.S, 1st Edition, PHI Learning 2017.
2. Java 2 - The Complete Reference, Herbert Schildt, 5th Edition, McGraw Hill Publication, 2017.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**B.Com-Computer applications**	Semester	**III**
Course Title	**Operating System**		
Course Code:	**BCMCAVS302**	No.of Credits	**02**
Contact hours	**30 Hours**	Duration of Exam/SEE	**2hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):
On successful completion of the course, the Students will be able to
a) Analyze the structure of OS and basic architectural components involved in design
b) Analyze the various resource management techniques
c) Interpret the mechanisms adopted for file sharing
d) Conceptualize the components involved in designing a contemporary OS
e) To be familiar with various types of operating systems

Unit	**Description**	**Hours**
1	Introduction, What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Resource Management. **Operating System Structures**-Operating-System Services, User and Operating-System Interface. **Process Management**-Processes, Process Concept, Process Scheduling	**10**
2	**Threads and Concurrency**-Overview, Multithreading Models **CPU Scheduling-**Basic Concepts, Scheduling Algorithm **Deadlocks**-Deadlock Characterization, Methods for handling deadlock, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	**10**
3	**Linux:** An introduction, reason for its popularity, Linux files system, login and logout. **Linux commands:** Command format, Wild card characters **Directory oriented** commands – ls, mkdir, rmdir, cd, pwd **File oriented commands** – cat, cp,rm, mv, wc File Access Permissions , chmod command **Communication oriented commands** – write, mail, wall **General purpose commands** – date, who, who am i, man, cal, expr	**10**

	Pipe and Filters related commands - Redirection, pipe, sort, grep vi editor, Shell programming	

Text Books:

1. Silberschartz, Galvin and Gagne, Operating Systems Concepts, 10th Edition, JohnWiley& sons, Pvt. Ltd.2008
2. B Mohamed Ibrahim, Linux: A Practical Approach, Laxmi Publications; First edition, 2016

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**B.C.A**	Semester	**III**
Course Title	**Cloud Computing (Compulsory)**		
Course Code:	**BCMCAVS303**	**No. of Credits**	**03**
Contact hours	**30 Hours**	**Duration of Exam/SEE**	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

- CO1 Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- CO2 Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.
- CO3 Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- CO4 Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit	Description	Hours
1	**Introduction:** Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantages and Disadvantages, and Applications of Cloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**10**
2	**Cloud Architecture:** Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization,	**10**

	Technology Examples- Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V.	
3	**Cloud Application Programming and the Aneka Platform:** Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container; Building Aneka Clouds (Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode); Cloud Programming and Management- Aneka SDK (Application Model and Service Model); Management Tools (Infrastructure, Platform and Application management).	**10**

Text Books:

1 Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering CloudComputing- Foundations and Applications Programming", Elsevier, 2013

References Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering CloudComputing- Foundations and Applications Programming", Elsevier, 2013
2. 2 Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010
3. K Chandrashekaran: "Essentials of Cloud Computing", CRC Press, 2015

4 Derrick Rountree, Ileana Castrillo: "The Basics of Cloud Computing", Elsevier, 2014

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**B.Com-Computer application**	**Semester**	**III**
Course Title	**Java Programming Lab**		
Course Code:	**BCMCAVPS301**	**No.of Credits**	**02**
Contact hours	**52 Hours per week**	**Duration of Exam/SEE**	**3 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A: JAVA Programming Lab

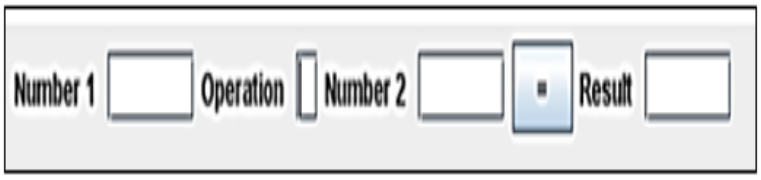
1. Write a Java program to find whether the given number is palindrome or not.
2. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
3. 2. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits.(Hint Input 327 and 539 output 3x5+2x3+7x9=84)
4. Write a program to initialize an integer array and find the maximum and minimum value of the array.
5. Create a class Box that uses a parameterized constructor to initialize the dimensions of a box. The dimensions of the Box are width, height, depth. The class should have a method that can return the volume of the box.
6. Given two strings, *a* and *b*, print a new string which is made of the following combination- first character of *a*, the first character of *b*, second character of *a*, second character of *b* and so on. Any characters left, will go to the end of the result.
    a. *Sample Example:*
        i. Input string: Hello,World
        ii. Output string: HWeolrllod

PART-B

1) Create a school application with a class called Person. Create name and D ate of Birth as member variables. Create a class called Teacher that inherits from the Person class. The teacher will have additional properties like salary, and the subject that the teacher teaches. Create a class called Student that inherits from Person class. This class will have a member variable called student-Id. Create a class called College Student that inherits from Student class. This class will have college Name, the year in which the student is studying (first/second/third/fourth) etc.Create objects of each of this classes, invoke and test the methods that are available in these classes.
2) Write a Menu drive Java program to perform following operation using Vector.
    a. INSERT an ITEM
    b. DELETE a SPECFIC ITEM
    c. DISPLAY SPECFIC ITEM
    d. DISPLAY ALL ITEMS
3) Write a Java program to read number form NUMBER.txt file and count the number of zero's, positive and negative numbers and display the result.

4) Write a Program to create an abstract class named shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method print Area() that print the area of the given shape.[Abstract class].
5) Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application

6) Write a program that creates a user interface to perform basic integer operations. The user enters two numbers in the textfields, Num1 and Num2. The result of operations must be displayed in the Result textfield when the "=" button is clicked. If Num1 or Num2 is not an integer, the program should throw NumberFormatException. If Num2 is Zero, the program should throw an ArithmeticException when division operation is applied. Display the exception in a message dialog box. **[Swing]**



Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution:5Marks**	**15Marks**
Program-2	**PART-B** **Writing:5 Marks Execution:5Marks**	**20Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Semester: IV

Program Name	B.Com-Computer application	Semester	IV
Course Title	Web Application Development		
Course Code:	BCMCAVS401	No.of Credits	03
Contact hours	48 Hours per week	Duration of Exam/SEE	3 hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Web Application Development

Course Contents:

Unit	Description	Hours
1	Internet Basics,Hyper Text Markup Language-Formatting tags-Creating Web Page Links-Listing Text On Your Page – Tables in HTML- Frames in HTML – Brightning Your Page With Animated Text And Images –HTML5 Web Forms-Building forms in HTML5-Drawing with the Canvas Element-Cascading Style sheet - Style sheet basic – Applying CSS to HTML document – Understanding Css Transitions–Enriching Forms Using CSS3 Properties-Transforming The Message	12
2	Introduction to JavaScript – Advantages of JavaScript – JavaScript syntax-data type – Variable-Array – operator & expression – looping constructor – Function – Dialog Box	12
3	JavaScript document object model – Introduction – object in HTML – Event Handling – Window Object – Document Object – Browser Object – Form Object – Navigator Object Screen Object – Build In Object – User Defined Object, Cookies.	12
4.	. ASP. NET Language Structure – Introduction To Visual Studio 2012 IDE –understanding ASP.NET 4.5 Directives. Basic Web server Controls- Label, Textbox, Button, Image, Link Button Check & Radio button, Hyperlink. Data List Web Server Controls - Check box list, Radio button list, Drop down list, List box. Validation controls.	12

Text Book:

1) Javascript, A Beginner's Guide 3rd edition, by John Pollock, Published by McGraw-Hill Professional Publishing
2) ASP .NET 4.0(covers c# and vb 2010codes), Black book by Kogent and Dreamtech PRESS Publication, Edittion -2013

Reference Books:

1) Ivan Bayross, HTML5 and CSS3 made Simple, BPB publications.
2) Javascript:The Definitive Guide, 6th edition By David Flanagan – Published by O'Reilly Media, Inc.
3.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Semester: IV

Program Name	**B.Com-Computer application**	**Semester**	**IV**
Course Title	**Computerized Accounting**		
Course Code:	**BCMCAVPS402**	**No.of Credits**	**03**
Contact hours	**48 Hours per week**	**Duration of Exam/SEE**	**3 hours**
Formative Assessment Marks	**20**	**Summative Assessment Marks**	**80**

B.Com 4.3: Computerized Accounting

Unit	Description	Hours
1	**Excel: Working with Data**: Working with Data in a Worksheet, Wrapping Text, Modifying Data of a worksheet, Copying a Worksheet, Working with Number formatting, Exploring Charts, Working with sparklines, Working with Conditional Formatting, Exploring Sort and Filter Features, Filtering Table Data Using Slicer **Working with Formulas and Functions:** Understanding formulas, Exploring cell referencing, Defining the Basic concepts defined in a Function, Using Mathematical and statistical Functions, Working with logical functions, Working with LookUp and Reference, Working with Auditing Tools **Working with Data Analysis Tools and Data Protection:** Working with a Pivot Table **Working with Google Sheets:** Features of Google Sheet, Creating Google Sheet, Importing and Exporting data in Google Sheet, Putting Comments on a Google Sheet, Sharing a Google Sheet.	**12**
2	**Computerized Accounting:** Exploring Computerized Accounting **Tally. ERP 9 and Elemental Features:** Introduction, opening the Tally ERP 9 Application, Understanding the components of the Tally ERP 9 Application Window, Mouse and Keyboard Convections, Managing the screen Area, Closing the Tally.ERP 9 Application, Creating a company in Tally ERP9, Selecting a company, Shutting a company, Altering Company Details, Company Features, Configuring Tally **Creating Masters in Tally ERP9:** Introduction, Creating Accounting Masters in Tally ERP9-Groups, Ledgers.	**12**

	Working With Vouchers: Introduction, Creating Voucher Type, Accounting Vouchers	
3	Creating Inventory Masters in Tally ERP9-Stock Groups, Stock Categories, Godowns, Units of Measure, Stock Items. Inventory Vouchers, Order Processing, Optional and Non-Accounting Vouchers **Reports in Tally:** Introduction, Financial statements, Day Book, Accounting Books and Registers, Inventory Books and Registers, Statements of Accounts, Statements of Inventory, Management Information System Reports.	**12**
4.	**Goods and Service Tax:** Introduction, Features of GST, Benefits of GST, Classification of GST, Enabling GST in Tally.ERP 9, Creating Masters for GST, Creating vouchers for GST, Viewing the GST Rates. **Data Handling in Tally :**Introduction , Taking the backup of data in tally, Restoring data , exporting data ,password policy **Tax Deducted at source (TDS**): Introduction , Basic terminology of TDS , Enabling TDS , Creating ledgers , Creating TDS Vouchers, TDS reports	**12**

Text Book:

1. Comdex, Tally.ERP9 course kit with GST &MS Excel- Vikas Gupta, Dreamtech Press.

Reference Books:

1. Parag Joshi, Tally.ERP 9 with GST with Solved Problems, Dnyansankool Prakashan; 1st edition, 2017.
2. .Asok K. Nadhan, Tally ERP 9 Training Guide, BPB Publications; Fourth edition, 2018.
3. Rajesh Chheda, Learn Tally.ERP 9 with GST and E-Way Bill, Ane Books; 3 edition, 2018.
4. Yogesh Patel, Free Accounting with Free Software, Skylark Publications (UK); First edition, 2011
5. Student Guide-40571A Micrsoft Excel expert 2019
6. SIA Experts, Computerized Accounting, SIA Publishers & Distributors Pvt Ltd, 2018
7. Yadagiri M., Srinivas G., Computerized Accounting, Jain Book Agency, 1st edition, 2008
8. Francis Princy, Computerized Accounting Tally-9 , Kalyani Publications, 2014
9. Tally Education Pvt Ltd, GST Using Tally.ERP 9 Release 6.1, Sahaj Enterprises; 1 Edition, 2017.
4.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/Problem Solving/Trouble shooting.

Program Name	**B.Com-Computer application**	**Semester**	**IV**
Course Title	**Web Application Lab**		
Course Code:	**BCMCAVPS401**	**No.of Credits**	**02**
Contact hours	**52 Hours per week**	**Duration of Exam/SEE**	**3 hours**
Formative Assessment Marks	**10**	**Summative Assessment Marks**	**40**

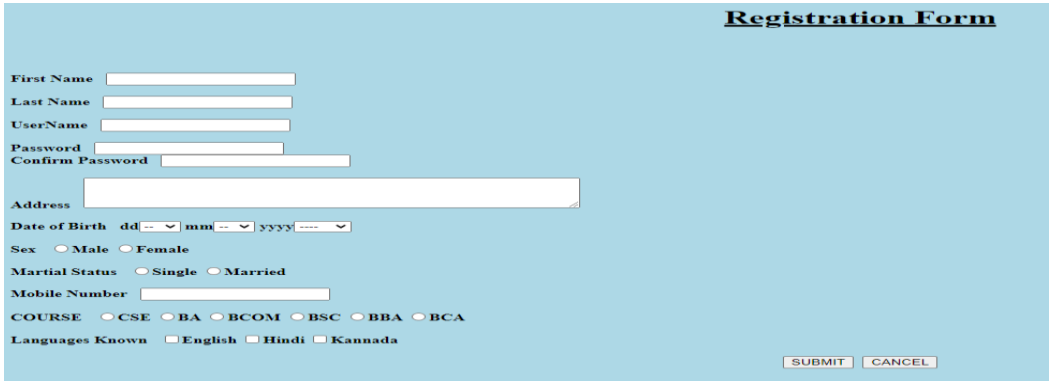
PART-A

1. Write a HTML program for any 10 different Tags.
2. Write a HTML program for create small website.
3. Write a HTML program for time-table using tables

Timetable of IV SEMESTER BOCM

DAY	I	II	III	IV	LUNCH BREAK	V	VI	VII
MON	TALLY	SAT	ENG	LANG		WT	ACC	IT
TUE	ENG	TALLY	TALLY Lab			LANG	STAT	WT
WED	ACC	ENG	LANG	AI		EC/CC		
THU	AI	STAT	TALLY	WT		WT Lab		
FRI	LANG	ACC	TALLY	WT		EXCEL Lab		
SAT	ENG	LANG	IC	TALLY		HOLIDAY		

4. Write a HTML program to develop a static Registration Form

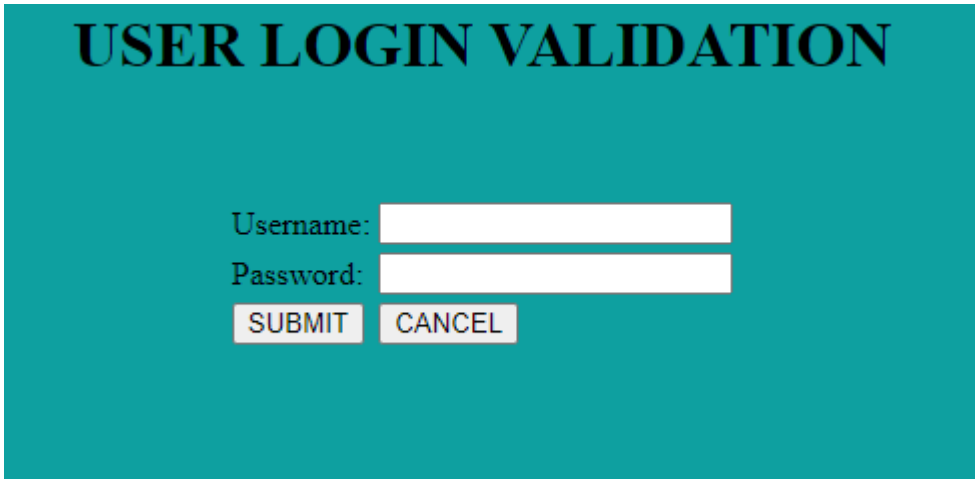


5. Write a HTML program to develop a static Web Page for Catalog.

PART-B

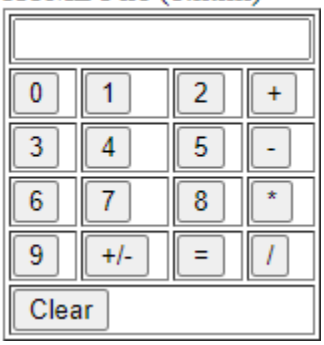
1. Develop a HTML5 document to create a ‘No Parking’ sign as shown below. (use canvas element)

2. Write a JavaScript program to validate USER LOGIN page.



3. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.

HTML File (1.html)



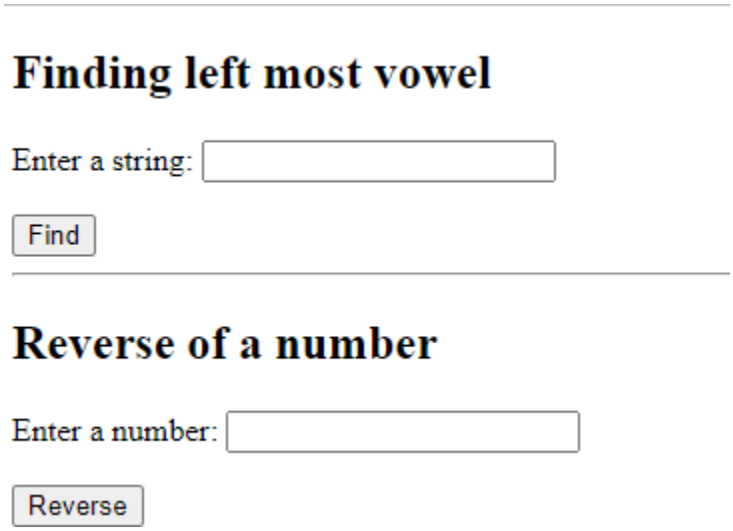
4. Develop and demonstrate a HTML file that includes JavaScript script that uses functions for the following problems:

    a. Input: A string

Output: The position in the string of the left-most vowel

b. Input: A number

Output: The number with its digits in the reverse order



5. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.

Number	Square	Cube
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512
9	81	729
10	100	1000

6. Write a JavaScript that calculates the Addition of two Matrixes displays the resulting values in an HTML table format.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution:5Marks**	**15Marks**
Program-2	**PART-B** **Writing:5 Marks Execution:5Marks**	**20Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Program Name	**B.Com-Computer application**	**Semester**	**IV**
Course Title	**Computerized Accounting Lab**		

Course Code:	**BCMCAVPS402**	**No.of Credits**	**02**
Contact hours	**52 Hours per week**	**Duration of SEA/Exam**	**3 hours**
Formative Assessment Marks	**10**	**Summative Assessment Marks**	**40**

PART-A

1. **Create a worksheet with sl.no. Name of the salesman, Item, no. of items sold, rate per unit, total amount.**

    a) Find the total number of items sold.

    b) Round the total sales to 1 digit.

    c) Find the sum of sales of item equal to book.

    d) Count the sales if item equal to soap.

    e) Concatenate name with total amount.

2. **Create a student worksheet with the following format: (Use data validation while entering marks).**

Student Name	Arjun	Bhuvan	Deepa	Ranjan	Vindhya
Kannada	68	54	65	43	87
English	90	68	76	86	98
Science	87	67	56	76	56
Maths	65	65	65	87	98
Social	87	98	87	86	76
Hindi/Sanskrit	76	65	54	43	65

    a) Create a drop down list for Student Name in separate cell. Using Hlookup function retrieve the mark of Bhuvan in Science.

    b) Fetch the marks in all subjects of Deepa.

    c) Use VLookup function to obtain the maths mark of Vindhya.

    d) Calculate total marks. Retrieve the total mark of the student who obtained maximum total marks.

    e) Draw a chart to display top three students and their marks

3. Create a worksheet with fields Country, Resort Name, No of days, TravelMethod (PLANE,TRAIn,BUS….) and Price. Insert at least 10 records. Create a pivot table from this data, then use the filters within to view the average prices of holidays that have a Travel Method of Plane and a Resort Name that begins with the letter S.

4. Create a worksheet to enter Employee details like Employee Id, Name, Designation, Phone no., address, email_id, salary, DA, HRA, PF, Gross Salary, net salary.
   a. Find the gross AND net salary of the employees.
   b. Use Lookup function to Retrieve Employee address of the employee selected from the list.
   c. Use Scenario Manager to find net salary of an employee with different salaries.
   d. Use goal seek to find salary if the net salary is 40,000

5. Create a WORKSHEET WITH FIELDS

First name	Last name	Hobby	City	Weight (KG)
Ben	Hill	Reading	Leicester	84

Insert 10 records

Using the "Data" tab, perform the following filtering:

1. Filter for people who's hobbies are: Chess, Football, Karate, Reading or Tennis

2. Find people who live in London and have the hobby of Bird

Watching

3. Find people who either have the first name Guy or weigh 70 KG.

4. Filter for people with a first name that contains B , followed by a single letter, followed by N.

5. Filter for people whose Last Name starts with J, followed by 0 or more characters, followed by the letter S

PART-B

6. Record the following vouchers in Tally and generate Balance sheet.

July 1 2020	Ram commenced business with cash 10,000
July 30 2020	Paid to bank, 8000
August 1 2020	Bought goods for cash 500
August 1 2020	Bought Office furniture 400
August 1 2020	Drew from bank for office 1000
August 30 2020	Goods sold to Shyam 2600
August 30 2020	Bought goods from Kishan 410
Sep 1 2020	Trade expenses paid 100
Sep 1 2020	Received cash from Shyam 600
Sep 30 2020	Wages paid 50
Oct 1 2020	Kishan paid off in full settlement of his account 410
Oct 1 2020	Rent paid 100
Oct 30 2020	Interest due on capital 500

7.Record the following transactions for Ram Home Needs for the year 2014-15

Jun 1	Ramu commenced business with cash Rs.20000
Jun2	He bought goods for cash. Rs. 10000
Jul 31	Bought furniture Rs. 2000
Aug 1	Deposited into bank Rs. 5000
Sep 1	Sold goods in cash Rs. 18000
Oct 31	Withdrawn cash for personal use Rs.500
Nov 1	Paid commission Rs.200
Dec 1	Paid rent Rs.200
Dec 31	Paid salaries Rs.200

Export the balance sheet into excel worksheet.

8.Journalize the following

On 1-7-2020 Mr. Naresh started business with cash Rs.50,000

Stock in hand:

Item	Quantity	Rate per
Pen	3000	8
Pencil	2500	5
Eraser	1200	4
Sharpener	3000	2
Crayon	200	10

- On 1-7-2007 purchased 1500 Pens @Rs.8 each, 750 Pencils @Rs. 5 each, 1000 Eraser @Rs. 4 each from J.J.Stores
- On 1-7-2007 sold 200 Pens @ Rs.10 each, 300 Pencils @Rs.6 Each, 400 Eraser @6 Rs. Each for cash.
- On 2-7-2007 sold 1100 Pens @Rs. 12 each, 400 Pencils @Rs.7 each, 500 eraser @ Rs.6.50 each for cash

- On 2-7-2007 opened an SB Account in Syndicate Bank by depositing Rs. 65000

9.Create a company and pass necessary entries.

- On 1st Dec 2020 cash paid for conveyance Rs.10000 to marketing, sales and admin department in the ratio 4:4:2. Pass the necessary entry using cost center and category.
- On 2nd Dec 2020 cash paid for projected purchase of raw material worth Rs. 28000 from Rahul enterprise bill no-212 (Gross value Rs.25000 and gst@12% Rs.3000). Pass the necessary entry using cost center and category.
- On 2nd Dec 2020 raise an invoice for Rs.47200(gross value Rs.40000+gst @18% Rs. 7200) to Jugal Technologies towards sales of finish goods (INVOICE No- TI/01/2020-21). Pass the necessary entry using cost center and category (project sales).

Note: Detail of debtor and creditors:

Name	GST No	Address
Rahul Enterprises	07DTQPK8687M1ZF	PLOTNO 1 BAWANA INDUSTRIAL AREA DELHI
Jugal Technologies	07GZGPS0194J1ZU	KARAWALNAGAR,DELHI-119044

Pass necessary entries for the following under GST.

- ABC Pvt. Ltd. Sales one mobile phone on of gross value of mobile phone is Rs.15000/- and charge GST @12% (Rs.1800) total value Rs.16800 invoice no-01/T/20-21 to Mr.X in Delhi as Local Sales. Make sales invoice.
- ABC Pvt. Ltd. Sales two same mobile phone of gross value Rs.10,000 each and charge IGST@12% invoice no-02/20-21/TI to Mr.Y. He lives in Uttar Pradesh pass the necessary entry.
- On 1st July 2020 Mobile solutions ltd. Sales 5 mobile phone costing Rs.6000 each and Charge GST @12% on cost (invoice no-06/TI/2020) to ABC Pvt. Ltd. Mobile Solution Established in Delhi. Pass the necessary entry

- XYZ Ltd.(Uttar Pradesh) Sales 4 Mobile phones on 1st july 2017 costing Rs.7000 each charge IGST @12% (invoice no-03/TI/20-21) to ABC. Pvt. Ltd. Make purchase entry.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution:5Marks**	**15 Marks**
Program-2	**PART-B** **Writing:5 Marks Execution:5Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BACHELOR OF COMPUTER APPLICATIONS
BCA-DATA ANALYTICS

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programmes

[BCA, BCA (A.I & M.I), BCA (D.A)]

Semester	**Course 1**	**Course 2**	**Course 3**	**Elective / Optional**	**Course**	**Language**	**Compulsory**	**Total Credit**	**Total Working hour**
I	5 (3T+2P)	5 (3T+2P)	5 T			3+3	2	23	4+4+4+4+5+4+4+2=31
II	5 (3T+2P)	5 (3T+2P)	5T			3+3	2	23	4+4+4+4+5+4+4+2=31
III	5 (3T+2P)	5 (3T+2P)	5T	2		3+3		23	4+4+4+4+5+4+4+2=31
IV	5 (3T+2P)	5 (3T+2P)	5T	2		3+3	2	25	4+4+4+4+5+2+4+4+2=33
V	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]				2	26	3+3+4+3+3+4+3+3+4+2=32
VI	3T	3T	3T	3T	Research Methodology +Project work 12			24	3+3+3+3+24=36
								144	

Note:

- **Course1 and Course2: I to IV Semester: Theory 3 credit=4 contact hours & Practical 2 credit=4 contact hours**
- **Course3: I to IV Semester: Theory 5 credit=5 contact hours**
- **Course1, Course2 and Course3: V and VI Semester: Theory 3 credit=3 contact hours & Practical 2 credit=4 contact hours**
- **Elective/Optional: 2 credit=2 contact hours**
- **Languages: 3 credit=4 contact hours**
- **Compulsory: 2 credit=2 contact hours**

CURRICULUM STRUCTURE FOR ITO VI SEMETER BCA-DATA ANALYTICS

Semester I								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**LANGUAGE-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**LANGUAGE-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCA –DA-1.1**	**Fundamentals of Information Technology**	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCA –DA-1.2**	**Programming in C**	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCA –DA-1.3**	**Computational Mathematics**	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCA –DA-1.4**	**Office Automation Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
7	**BCA –DA-1.5**	**C Programming Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
8		**Constitution Values**	**Compulsory**	**2**	**40**	**10**	**50**	**2**
Sub – Total				**31**	**520**	**130**	**650**	**23**

Semester II								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**LANGUAGE-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**LANGUAGE-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCA –DA-2.1**	**Data Structure using C**	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCA –DA-2.2**	**Database Management System**	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCA –DA-2.3**	**Computer Organization and Architecture**	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCA –DA-2.4**	**Data Structures Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
7	**BCA –DA-2.5**	**Database Management System Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
8		**Constitution Values**	**Compulsory**	**2**	**40**	**10**	**50**	**2**
Sub – Total				**31**	**520**	**130**	**650**	**23**

Semester III								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**LANGUAGE-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**LANGUAGE-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCA – DA-3.1**	**Operating System**	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCA – DA-3.2**	**Object Oriented Programming using Java**	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCA – DA-3.3**	**Computer Networks**	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCA – DA-3.4**	**Operating System Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
7	**BCA – DA-3.5**	**Object Oriented Programming Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCA – DA-3.6**	**A) Digital Marketing** **B) Web Content Management System** **C) DEVOPS**	**Elective**	**2**	**40**	**10**	**50**	**2**
Sub – Total				**31**	**520**	**130**	**650**	**23**

Semester IV								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**LANGUAGE-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**LANGUAGE-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCA – DA-4.1**	**Python Programming**	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCA – DA-4.2**	**Statistical Computing using R**	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCA – DA-4.3**	**Data Warehousing and Data Mining**	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCA – DA-4.4**	**Python Programming Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
7	**BCA – DA-4.5**	**Data Analytics Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCA – DA-4.6**	**A) Cloud Computing** **B) Internet Basics** **C) Object Oriented Analysis and Design**	**Elective**	**2**	**40**	**10**	**50**	**2**
9	**BCA – DA-4.7**	**Data Analytics using Excel**	**Compulsory**	**2**	**40**	**10**	**50**	**2**
Sub – Total				**33**	**620**	**180**	**800**	**25**

Semester V								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BCA –DA-5.1**	**Software Engineering**	**Core**	**3**	**80**	**20**	**100**	**3**
2	**BCA –DA-5.2**	**Artificial Intelligence**	**Core**	**3**	**80**	**20**	**100**	**3**
3	**BCA –DA-5.3**	**Business Intelligence and Analytics**	**Core**	**3**	**80**	**20**	**100**	**3**
4	**BCA –DA-5.4**	**Web Development**	**Core**	**3**	**80**	**20**	**100**	**3**
5	**BCA –DA-5.5**	**Machine Learning**	**Core**	**3**	**80**	**20**	**100**	**3**
6	**BCA –DA-5.6**	**Design Analysis and Algorithm**	**Core**	**3**	**80**	**20**	**100**	**3**
7	**BCA –DA-5.7**	**Artificial Intelligence andMachine Learning-LAB**	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCA –DA-5.8**	**Web Development-Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
9	**BCA –DA-5.9**	**Algorithms Lab**	**Practical**	**4**	**40**	**10**	**50**	**2**
10	**BCA –DA-5.10**	**Data Visualization with Power BI and Tableau**	**Compulsory**	**2**	**40**	**10**	**50**	**2**
Sub – Total				**32**	**640**	**160**	**800**	**26**

Semester VI								
Sl No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1	**BCA-DA-6.1**	**Natural Language Processing**	**Core**	**3**	**80**	**20**	**100**	**3**
2	**BCA-DA-6.2**	**Big Data Analytics**	**Core**	**3**	**80**	**20**	**100**	**3**
3	**BCA-DA-6.3**	**Multivariate Data Analysis**	**Core**	**3**	**80**	**20**	**100**	**3**
4	**BCA-DA-6.4**	**Principles of Cyber Security**	**Core**	**3**	**80**	**20**	**100**	**3**
5	**BCA-DA-6.5**	**Research Methodology Project Work**	**Project Work**	**24**	**300**	**100**	**400**	**12**
Sub – Total				**36**	**640**	**160**	**800**	**24**

SEMESTER III

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Operating System (THEORY)**		
Course Code:	**BCABDAS301**	No.of Credits	**03**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes(COs):

At the end of the course,students will be able to:

- Understand the fundamentals of the operating system.
- Comprehend multithreaded programming ,process management ,process synchronization, memory management and storage management.
- Compare the performance of Scheduling Algorithms.
- Identify the features of I/O and File handling methods.

Unit	Description	Hours
1	**Introduction:** Operating System, Simple Batch Systems, Multi programmed Batched Systems, Time Sharing Systems ,Real-Time Systems, Multi-processor Systems. SystemComponents,OperatingSystemServices**.Process:**ProcessConcept,ProcessScheduling,CooperatingProcess,**Threads** (Thread Concept, Single and Multiple Threads, Benefits): **CPU Scheduling:** Basic Concepts,Scheduling Criteria, Scheduling Algorithms.	**13**
2	**Process Synchronization**: Introduction Race Condition, CriticalSection, Semaphores; Classic Problems of Synchronization-	

	Readers and Writers Problem ,Dining Philosophers Problem. **Deadlocks:** Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	**13**
3	**Memory Management.** Logical versus Physical Address Space, Swapping, Contiguous Allocation (Memory Allocation, Fragmentation),Paging (BasicMethod), Segmentation(BasicMethod). **Virtual Memory.**Demand Paging, Page Replacement,Page Replacement Algorithms, Thrashing (concept). **File System.** File Concept, Access Methods **Disk Scheduling(I/OManagement):**Introduction and Scheduling Algorithm	**13**
4	**Linux files system**,login and logout. **Linux commands:** Command format, Directory oriented command, wild card characters, File oriented commands, File Access Permissions, Process oriented commands, Background processing, Communication oriented commands, General purpose commands,**Pipe and Filters** related commands, Vi**editor, Shell programming**,	**13**

Text Books:

1. AbrahamSilberschartzandPeterGalvin,**OperatingSystemConcepts**,6thedition , TMH
2. K.L. James, Linux:LearningtheEssentials,PHIlearningprivatelimited,2011
3. BMohammed Ibrahim,**Linux:APracticalApproach,**FireWallMedia,2009

Reference Books:

1. AndrewSTanenbaum, **OperatingSystemDesignandImplementation**,PHI
2. MilanMilenkovic,**OperatingSystems**,TMH
3. CristopherNegus,Dreamtech,**RedHatLinux9Bible**,WileyPublication

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Self Directed Learning /Problem solving etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Object Oriented Programming using Java (THEORY)**		
Course Code:	**BCABDAS302**	No.of Credits	**03**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the features of Java and the architecture of JVM
- Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
- Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Unit	Description	Hours
1	**Fundamentals of Object Oriented Programming**: Introduction, Object Oriented Paradigm, Basic Concepts of OOP, Benefits and Applications of OOP. Introduction to Java: Java Features, Java Environment, Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Java Virtual Machine. Java **Programming Basics**: Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of	**13**

	variables, Symbolic constants, Type casting. Operators and **Expressions**: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators, Mathematical functions. **Using I/O**: Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output. Decision Making & Branching: Simple if statement, if..else statement, nesting of if..else statement, the else..if ladder, the Switch statement.	
2	**Decision making & Looping** -The while statement, the do statement, the for statement . Jumps in loops, Labelled loops. **Class & Objects** - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-Line Arguments, Varargs : Variable-Length Arguments **Arrays and Strings**: One dimensional arrays, Creating an arrays, Two dimensional arrays , Strings, Vectors, Wrapper classes.	**13**
3	**Inheritance** - Inheritance Basics, Using 'super', Creating Multilevel hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance. **Packages & Interfaces** - Packages, Access protection in packages, Importing Packages, Interfaces. **Exception Handling** - Exception Handling Fundamentals – Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's builtin Exceptions	**13**
4	**Multithreaded Programming**- Introduction, Creating threads, Extending the thread class, stopping & blocking thread, Life cycle of a thread, Using thread methods, Implementing the runnable interface. **Event and GUI programming**: The Applet Class, Types of Applets, Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repaint, The HTML APPLET tag. Event Handling - The delegation event model, Event Classes ActionEvent, KeyEvent & MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener & MouseListener interfaces. Using the Delegation Event Model. Window Fundamentals, Working with Frame Windows,	**13**

	Creating a Frame Window in an Applet. Creating a Windowed Program, Displaying information within a window. **Introducing swing** – two key swing features, components and containers, the swing packages, a simple swing application, event handling. Exploring Swing- Jlabel, JTextField, JButton, Checkboxes , 13 Radio buttons , Jlist , JComboBox. **JDBC Objects** - The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, Result Set, Metadata, Data types. **JDBC & Embedded SQL** – Tables, Inserting Data into Tables, Selecting Data from Table, Updating Tables, Deleting Data from a Table	

Text Books:

1. E Balagurusamy, Programming with Java –A Primer, Fourth Edition, Tata McGrawHill Education Private Limited.
2. Herbert Schildt, Java :The Complete Reference, Seventh Edition, McGrawHill Publication.

Reference Books:

1. Herbert Schildt, Java 2-TheCompleteReference,Fifth Edition, McGrawHill publication.
2. CayS. Horstmann, Core Java VolumeI–Fundamentals, Prentice Hall.
3. Somashekara, M.T., Guru, D.S., Manjunatha, K.S, Object Oriented Programming with Java, EEE Edition, PHI.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/Problem solving / Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Computer Networks (THEORY)**		
Course Code:	**BCABDAS303**	No.of Credits	**05**
Contact hours	**5 Hours per week**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes(COs):

At the end of the course,students will be able to:

- Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks in real world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model ikeTCP/IP and OSI.

Unit	Description	Hours
1	**Introduction:** Uses of Computer Networks and its Applications-Business Applications, Home Applications, Mobile Users, Social Issues. Network Hardware-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network software Reference Models-The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP Reference Models.	**13**
2	**The Physical Layer**: Transmission Media-Twisted Pair, Coaxial Cable, and Fiber Optics. Wireless Transmission-Radio Transmission, Microwave	**13**

	Transmission, Infrared, Light Transmission. Multiplexing- Frequency division, time division,code division, Switching. **The Data Link Layer**: Data link layer design issues- Services Provided to the Network Layer, Framing, Error Control, and Flow Control. Error Detection and Correction-Error-Correcting Codes, Error –Detecting Codes. Sliding Window Protocols– A One Bit Sliding Window Protocol, A Protocol Using Go back n, A Protocol using Selective Repeat.	
3	**The Network Layer**: Network layer design issues-Store- and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Networks. Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing, Hierarchica Routing, Approaches to Congestion Control, The IP Version4 Protocol, IP Address, IP Version 6,Internet Control Protocol, The Interior Gateway Routing Protocol: OSPF, The Exterior Gateway Routing Protocol: BGP	**13**
4	**The Transport Layer:** The Transport Service-Services Provided to the Upper Layers. Elements of Transport Protocols-Addressing, Connection Establishment, connection Release. The Internet Transport Protocols-(TCP and UDP)-UDP-Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. **The Application Layer**: DNS–Domain Name System-The DNS Name Space, Domain Resource Records, Name Servers. Electronic Mail-Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The Word Wide Web- Architectural Overview, Static Web Pages, Dynamic Web Pages and Web Applications, HTTP—The Hyper Text Transfer Protocol.	**13**

Text Book:

1. Computer Networks , Andrew S.Tanenbaum, 5thEdition , Pearson Education,2010.

Reference Books:

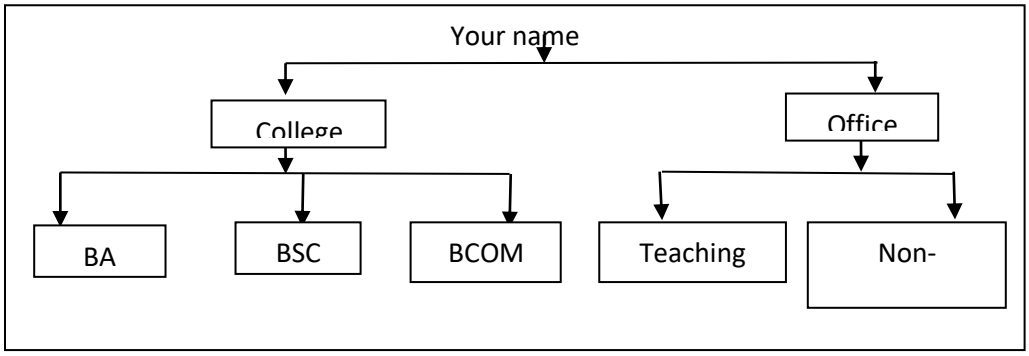
1. Data Communication & Networking ,Behrouza A Forouzan, 3rdEdition , TataMcGrawHill, 2001.
2. Data and Computer Communications ,WilliamStallings 10thEdition ,PearsonEducation,2017.
3. Data Communication and Computer Networks, Brijendra Singh, 3rdEdition,PHI,2012.
4. Data Communication & Network,Dr.Prasad,WileyDreamtech.

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Case Studies examples/Group Discussion/ Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Operating System Lab**		
Course Code:	**BCABDAPS301**	No.of Credits	**02**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Create the directory structure.



i. Put a file under BA, B.Com,Teaching and Non Teaching with meaningful content.
ii. Goto BA directory and then move its file to non teaching directory.
iii. Change the directory to nonteaching from root directory using only single command.
iv. From BA copy the content to B.Com. Delete BA directory recursively

2. Consider the above directory structure.
   i. List the files in long format. Starting from root directory including sub directory contents
   ii. Count how many files exist in office directory.
   iii. Display the present path.
   iv. Display current date in the form MM/DD/YY HH:MM:SS
3. Create a file which contains students information such as Rollno, Name, Gender, class (BCA, Bsc, B.com), Total marks.
   a. Append the 2 more records.
   b. Display the contents.
   c. Display the records of only BSc course and sort on reverse order of name and store in BSCnew.txt.
   d. Display the contents of BSCnew.txt
   e. Rename the student.dat to stud.dat
4. Using the above stud.dat file
   a. Add the following permission
      i. Execute for user.
      ii. Remove write permission for group
      iii. Check the changes in the permission by listing the file.
   b. Select only the female names and store in female.dat and male names to male.dat
   c. Combine these names from both the files .Show the new file.
   d. Change the case of alphabets of the contents in male.dat.

e. List all the files that start with “B” in the current directory.

5. Accept ‘n’ and check whether the number is a prime or not.
6. Accept ‘n’ and find the sum of the series 1!+3!+5!.....+n!.
7. Display all natural numbers between two integers,and also find their sum.

PART-B

1. Write a shell script to accept ‘n’ integers and count +ves,-ves and zeros separately.Also find the sum of +ves and –ves.
2. Write a shell script to accept many characters and count individual vowels,digits,spaces,special characters and consonants.
3. Write a shell script to accept student name and marks in 3 subjects through command line arguments.Find total marks,average and grade(depending on average marks).
4. Accept a word and check whether it begins with lowercase vowel or uppercase vowel,ends with a digit or whether it is a three letter word.
5. Write a menu driven shell script for the following.
   i)Display the current working directory.
   ii)Rename a file(check for the existence of the source file)
   iii)List the users logged in.
   iv)Append the contents of a file to another file(display the message if the file doesn’t exist in the directory).
6. Write a menu driven shell script for the following.
   a. Rename a file (check for the existence of the source file)
   b. List all file names/ directory names in the present working directory which has the specified pattern
   c. List of directory having all the permission
   d. List only files names in long format.
7. Write a shell script to accept many filenames through command line. Do the following for each filename
   a. If it is an ordinary file, display its content and also check whether it has execute permission.
   b. If it is directory, display the number of files in it.
   c. If the file/directory does not exist, display a message

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution:8Marks**	**15Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Object Oriented Programming Lab**		
Course Code:	**BCABDAPS302**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

PART-A

1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
2. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits.(Hint Input 327 and 539 output 3x5+2x3+7x9=84)
3. Program to input Start and End limits and print all Fibonacci numbers between the ranges.(Use for loop)
4. Define a class named Pay with data members String name, double salary, double da, double hra, double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.
   Dearness Allowance = 15% of salary
   House Rent Allowance = 10% of salary
   Provident Fund = 12% of salary
   Gross Salary = Salary + Dearness Allowance + House Rent Allowance
   Net Salary = Gross Salary - Provident Fund
   Write a main method to create object of the class and call the methods to compute and display the salary details. [class basics]
5. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum ( ) to add two

distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.).

6. Program to extract portion of character string and print extracted string. Assume that ‘n’ characters extracted starting from mth character position.
7. Program to add, remove and display elements of a Vector

PART-B

1. Create a class named 'Member' having data members: Name, Age, PhoneNumber, Place and Salary. It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherit the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same. [inheritance]

2. Write a Program to calculate marks of a student using multiple inheritance implemented through interface. Class Student with data members rollNo, name, Stringcls and methods to set and put data. Create another class test extended by class Student with data members mark1, mark2, mark3 and methods to set and put data.
   Create interface sports with members sportsWt = 5 and putWt().
   Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.

3. Write a Program to create an abstract class named shape that contains two integers and an empty method named print Area().
   Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method print Area() that print the area of the given shape.[Abstract class]

4. Create a package to convert temperature in centigrade into Fahrenheit, and one more package to calculate the simple Interest. Implement both package in the Main () by accepting the required inputs for each application.

5. Write a Program that implements a multi-threaded program has three threads. First thread generates a random integer every second, and if the value is even, second thread computes the square of the number and prints.

If the value is odd the third thread will print the value of cube of the number.[Multithreading]

6. Using the swing components, design the frame for shopping a book that accepts book code, book name, and Price. Calculate the discount on code as follows.

Code	Discount rate
101	15%
102	20%
103	25%
Any other	5%

Find the discount amount and Net bill amount. Display the bill.

7. Write a menu driven JDBC program to perform basic operations with Student Table. Operations to performed are insert student details, delete a specific student details and search for a student's details. [JDBC]

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8 Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Digital Marketing(ELECTIVE)**		
Course Code:	**BCABDAES301**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the fundamental concepts and principles of digital marketing.
- Develop practical skills to implement various digital marketing strategies and techniques
- Analyze and evaluate the effectiveness of digital marketing campaigns.
- Apply critical thinking and problem-solving skills to real-world digital marketing scenarios.
- Create comprehensive digital marketing plans and strategies.

Unit	Description	Hours
1	**Introduction to Digital Marketing:**Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms Digital Marketing Strategy and Planning: Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns.	**8**

2	**Social Media Marketing:**Overview of social media marketing, Social media platforms and their features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics **Email Marketing:**Introduction to email marketing, Building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics	**8**
3	**Mobile Marketing:**Mobile marketing overview, Mobile advertising strategies,Mobile app marketing, Location-based marketing, Mobile marketing analytics **Analytics and Reporting:** Importance of analytics in digital marketing, Setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	**10**

Text Book:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.

Reference Books:

1. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White
2. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi
3. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles
4. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**Web Content ManagementSystem(ELECTIVE)**		
Course Code:	**BCABDAES302**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand content development basics.
- Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting.
- Host websites and develop content for social media platforms such as wiki and blog.
- Understand e-publications and virtual reality.
- Use of e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	Web Content Development and Management, Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing.	**8**
2	Web Hosting and Managing Multimedia Content, Creating and Maintaining a Wiki Site. Presentation Software Part , Screen casting Tools and Techniques, Multilingual Content Development.	**8**
3	Planning and Developing Dynamic Web Content Sites, Website Design Using CSS Creating and Maintaining a WIKI Site, Creating and Managing a Blog Site.Content	**10**

	Management System: Joomla, Content Management System: Drupal	

Text Books:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.
2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
3. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
4. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Group Discussion/ Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**III**
Course Title	**DEVOPS(ELECTIVE)**		
Course Code:	**BCABDAPS303**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Design and manage a scalable VDI environment, addressing challenges such as boot storms and hardware limitations.
- Apply various DevOps tools to streamline and automate the software development lifecycle, including infrastructure as code and deployment automation.
- Utilize cloud services (IaaS, PaaS, Hybrid Cloud) to enhance DevOps practices, enabling full-stack deployments and efficient resource management.
- Integrate DevOps with ALM processes to improve the development, deployment, and management of mobile and multi-tier applications, scaling Agile methodologies across the enterprise.
- Define the roles of executives and teams in setting DevOps goals, expanding Agile practices, leveraging test automation, and building efficient delivery pipelines.
- Critically analyze and debunk common myths about DevOps, highlighting its applicability across various industries, including ITIL shops, regulated industries, and large, complex systems.

Unit	Description	Hours
1	**Introduction to DevOps:** Business needs for DevOps, Business values for Devops, How DevOps works. **DevOps Capabilities:** Paths to DevOps Adoption, Plan, Devlop/Test, Deploy, Operate **Adopting DevOps:** Where to Begin, People in DevOps, Process in DevOps, Technology in DevOps	**8**
2	**Using Cloud in DevOps** Cloud as DevOps enabler, Full Stack Deployments, cloud service model for DevOps, Hybrid Cloud **Using DevOps to solve Challenges** Mobile applications, ALM processes, Scaling Agile, Multiple Tier Applications, DevOPs in the enterprise, Supply Chains, IOT. DevOps Case Study: Executive's Role, putting together a team, setting DevOps Goals, Learning from the DevOps transformation, looking at the DevOps results. **DevOps Myths.**	**8**
3	**Basics of DevOps tools:** Git, Jenkins, Git lab, Docker, Kubernetes, Ansible, Terraform, Grafana, Sonar Qube	**10**

Text Books:

1. "DevOps For Dummies" by Sanjeev Sharma & Bernie Coyne. 2nd IBM Limited edition.

Reference Books:

1. " The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology" by Gene Kim, Jez Humble, Patrick Debois, John Willis

2. " the Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win" by Kim, Behr, Spafford

SEMESTER IV

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Python Programming (THEORY)**		
Course Code:	**BCABDAS401**	No.of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and creation of functions.
- Identify the methods to create and manipulate tuples and dictionaries.
- Discover the commonly used operations involving file handling.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop the emerging applications of relevant fields using Python.

Unit	Description	Hours
1	**Introduction to Features and Applications of Python;** Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. **Python Basics:** Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and	**13**

	Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. **Python Control Flow:** Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions. **Exception Handling:** Types of Errors; Exceptions; Exception Handling using try, except and finally. **Python Functions:** Types of Functions; Function Definition-Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; KeyWord Arguments ;Recursive Functions;Scope and Lifetime of Variables in Functions	
2	**Strings:** Creating and Storing Strings; Accessing String Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifies; Escape Sequences; Raw and Unicode Strings; Python String Methods. **Lists:** Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. **Dictionaries:** Creating Dictionaries; Operations on Dictionaries; Built-in Functionson Dictionaries; Dictionary Methods;Populating and Traversing Dictionaries. **TuplesandSets:** CreatingTuples; Operations onTuples;Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built- in Functions on Sets; Set Methods.	**13**
3	**File Handling:** File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator. **Object Oriented Programming:** Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, PrivateInstanceVariables;Polymorphism-	**13**

	Definition,OperatorOverloading. **GU Interface:** The tkinter Module; Window and Widgets; Layout Management- pack, grid and place	
4	**Python SQLite:** The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables Insert, Select, Update. Delete and Drop Records. **Data Analysis:** NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on DataFrames. **Data Visualization:** Introduction to Data Visualization; Matplotlib Library; Different Types of Charts using Pyplot Linechart , Barchart and Histogram and Piechart. Advanced data visualization with Seaborn	**13**

Text Books:

1. Introduction to python programming by Gowrishankar S. and Veena A., CRC Press.
2. Core python programming by Dr. R. Nageswara Rao, Dreamtech.

Reference Books:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
4. Advance Core Python Programming, MeenuKohli, BPB Publications, 2021.
5. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall, 2012.
6. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
7. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Statistical Computing using R (THEORY)**		
Course Code:	**BCABDAS402**	No.of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Explore fundamentals of statistical analysis in R environment.
- Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Unit	Description	Hours
1	Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting.	**13**
2	Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility. Basic Data Visualization.	**13**

3	**Descriptive Statistics:** Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median,Percentiles,Quartiles,Measures of Variability, Mean Absolute Deviation, Range, Inter-Quartile-Range, Standard Deviation,Z-Scores,Coefficient of Variation,Measure of Shapes, Bar Chart, Pie Chart and Box Plot, Histogram, Frequency Polygon, Stemand Leaf Diagram. **Probability, Probability and Sampling Distribution:** Methods of assigning probability, Structure of probability, Marginal, union, joint and conditional probabilities. Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution, Uniform Distribution,Estimating the population mean using the and t-distribution.	**13**
4	**Statistical Inference and Hypothesis Testing:** Types of Hypothesis, and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t-Test, Paired Sample t-Test, Independent Samples t-Test, One Way Analysis of Variance and Chi Square Test. **Correlation and Regression:** Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Karl Pearson Coefficient of Correlation, Correlation Matrix, Scatter Plots, Simple Regression Analysis.	**13**

Text Books:

1. Tilman M. Davies, "The book of R: A first course in programming and statistics", San Francisco, 2016.
2. Ken Black, Business Statistics, New Delhi, Wiley, 2013.

Reference Books:

1. Vishwas R. Pawgi, "Statistical computing using R software", Nirali prakashan publisher, e1 edition, 2022.

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Problem Based Learning/ Group Discussion/ Collaborative Learning/ Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Data Warehousing and Data Mining (THEORY)**		
Course Code:	**BCABDAS403**	No.of Credits	**05**
Contact hours	**5 Hours per week**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- On Successful completion of subject students will learn.
- Various Data Mining concepts, Association rules and Clustering techniques, Web mining Concepts & Decision tress.
- Ability to select and implement data mining techniques suitable for the applications under consideration.

Unit	Description	Hours
1	**Data Warehousing**: Introduction, What is Data Warehouse, Definition, Multidimensional Data Model, OLAP operations, Warehouse Schema, Data Warehouse Architecture, Warehouse Server, Meta Data, Data Warehouse backend process. **Data Mining:** Introduction, What is data mining, Data Mining Definitions, KDD Vs Data Mining, DBMS Vs Data Mining, Other related areas, DM techniques, Other Mining Problems, Issues and Challenges in DM, DM application areas, DM applications.	**15**
2	**Association Rules**: Introduction, Association Rule, Methods to discover association rules, a priori algorithm, partition algorithm, pincer-search algorithm(only concept), **Decision Trees**:Introduction, Decision Tree, Tree Construction	**15**

	Principle, Best Split, Splitting Indices (only definitions of Entropy, Information For A Partition on X, Gain, Gain Ratio) CART, ID3,C4.5**.** **Rough Set Theory** :Introduction, Definition, Rough Sets and Fuzzy Sets (concept, definition of rough set member function)	
3	**Other Techniques**: Introduction, Neural Network, Learning in NN, Unsupervised Learning, Genetic Algorithm. **Clustering Techniques:** Introduction, Clustering Paradigms, Partitioning, Algorithms, k-Medoid Algorithms (PAM concept, Partitioning concepts.), CLARA, Hierarchical Clustering, DBSCAN (concept Only), Categorical Clustering Algorithms, STIRR (concept)	**15**
4	**Web Mining**: Introduction, Web Mining, Web Content Mining, Web Structure Mining (exclude example), Web Usage Mining, Text Mining, Unstructured Text, Episode Rule Discovery for Texts. **Temporal and Spatial Advanced Data Mining**: Introduction, Temporal Data Mining, Temporal Association Rules, Sequence Mining, The GSP Algorithm, Episode Discovery, Spatial Mining, Spatial Mining Task	**15**

Text Books:

1. Arun K. Pujari, Data Mining Techniques, , Universities Press India, 3rd Edition 2016
2. Paul Teetor, R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'reilly Cookbooks, 2011

Reference Books:

1. M Ramakrishna Murthy, Introduction to Data Mining and Soft Computing Techniques, Laxmi Publications Pvt Ltd, 2017.
2. Paul Teetor, R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'reilly Cookbooks, 2011

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Group Discussion/ Experiential Learning / Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Python Programming Lab**		
Course Code:	**BCABDAPS404**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Write a program that generates a list of 20 random numbers between 1 and100. And perform the following operations:

   (a) Print the list.
   (b) Print the average of the elements in the list.
   (c) Print the largest and smallest values in the list.
   (d) Print the second largest and second smallest entries in the list
   (e) Print how many even numbers are in the list
2. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Consider a tuple t1= (1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
   a. Print square of the numbers present in the tuple
   b. Print another tuple whose values are even numbers in the above resultant tuple.
   c. Concatenate a tuple t2= (11,13,15) with t1 and display maximum and minimum value from this tuple.
4. Write a function that accepts a sentence from the user and perform following operations:
   a. To find the frequency of each word in the sentence.
   b. Search for a given word in the sentence and find the frequency of each letter in the given word.
5. Write a function to test whether two strings are nearly equal. Two strings a and b are nearly equal if one-character change in b results in string a.

6. Write a program to create a text file and compute the number of characters, words and lines in a file.
7. Write a Pandas program to join the two given data frames along rows. Sample Data frame may contain details of student like roll no, name , Total Marks.

PART-B

1. Program to create a class employee with Empno, Name, DeptName, Designation, Age and salary and perform the following operations.
   i) Accept details of N employees.
   ii) Display a list of employees belongs to specific department.
   iii) Display employee details in neat format.

2. Write a menu driven program to create a Bank Account class. class should support the following methods for

   1. Deposit
   2. Withdraw
   3. Get Balanace .

   Create a subclass Savings Account that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest.

3. Create a GUI program to input an integer and perform binary, octal, and hexadecimal conversion of the given number without using built-in function. When the 'Submit' button is pressed, the binary, octal, and hexadecimal values should be displayed in three different textboxes. When the 'Clear' button is pressed, all contents should be cleared.
   Propervalidation should be applied if the input is not an integer.

4. Write a GUI program to implement Simple Calculator.
5. Create a table Book (BookId, name, Author, edition, price) using MySQL and perform the followings
   a. To accept the details of Books and store it in database.
   b. To display the details of all the Book whose title starts with the letter 'A'.
   c. Delete particular record from the table where book price <1000.

(Proper validation should be applied)

6. Create a table employee (empno, name and salary) using MySQL and perform the followings

a. To accept the details of employees and store it in database.
b. To display the details of a specific employee
c. To display employee details whose salary lies within a certain range

(Proper validation should be applied)

7. Create a GUI program to read student information for 5 students which includes Roll No, Name, Class, and Marks in three subjects. Calculate the total marks, average, and grade. Determine the grade for Distinction, first class, second class, Pass, and Fail, and store the records in either a CSV or Excel file. Use matplotlib or seaborn to draw a Bar Chart showing the RollNo versus the Average score.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Data Analytics Lab**		
Course Code:	**BCABDAPS405**	No.of Credits	**02**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Write a program to create a 3 X 3 matrices A and B and perform the following operations
   a. $A^T.B$
   b. $B^T.(A.A^T)$
   c. $(A.A^T).B^T$
   d. $[(B.B^T)+(A.A^T)-100I_3]^{-1}$
2. Write R script to generate prime numbers between two numbers using loops
3. Write an R program to create a list containing strings, numbers, vectors and logical values and do the following manipulations over the list
   a) Access the first element in the list
   b) Give the names to the elements in the list
   c) Add element at some positions in the list
   d) Remove the element
   e) print the first and third element
   f) Update the third element
4. The following table shows the time taken (in minutes) by 100 students to travel to school on a particular day.

Time	0-5	5-10	10-15	15-20	20-25
No. of students	5	25	40	17	13

   a. Draw the histogram
   b. Draw frequency polygon

5. Write an R program to create a Data Frame with following details and do the following operations.

ItemCode	ItemCategory	ItemPrice
1001	Electronics	700
1002	Desktop Supplies	300
1003	Office Supplies	350
1004	USB	400
1005	CD Drive	800

   a. Subset the Data frame and display the details of only those items whose price is greater than or equal to 350.
   b. Subset the Data frame and display only the items where the category is either "Office Supplies" or "Desktop Supplies"
   c. Subset the Data frame and display the items where the Itemprice between 300 and 700
   d. Compute the sum of all Item Price
   e. Create another Data Frame called "item-details" with three different fields item Code, Item Qty on Hand and Item Reorder Lvl and merge the two frames.

6. Create a factor marital_status with levels Married, single, divorced. Perform the following operations on this factor
   a) Check the variable is a factor
   b) Access the 2^{nd} and 4^{th} element in the factor
   c) Remove third element from the factor
   d) Modify the second element of the factor
   e) Add new level widowed to the factor and add the same level to the factor marital_status

7. Write a R language Script for following operation on Iris Data Set
   a) Load the Iris Dataset
   b) View first six rows of iris dataset
   c) Summarize iris dataset
   d) Display number of rows and columns
   e) Display column names of dataset.
   f) Create histogram of values for sepal length
   g) Create scatter plot of sepal width vs. sepal length
   h) Create box plot of sepal width vs. sepal length
   i) Find Pearson correlation between Sepal.Length and Petal.Length

j) Create correlation matrix for dataset

PART-B

[Note: Problems are solved using R Script and Manual solution also]

1. Write a R program to create a Vector containing following 8 values and perform the following operations.

   4 3 0 5 2 9 4 5

   a. Find mean, median, mode.
   b. Find the range.
   c. Find the 35^{th} and 78^{th} percentile.
   d. Find the standard variance and standard deviation
   e. Find the inter quartile range.
   f. Find the z-score for each value.

2. Write R script to find the correlation coefficient and type of correlation between advertisement expenses and sales volume using Karl Pearson's coefficient of correlation method (Direct Method).

Firm	1	2	3	4	5	6	7	8	9	10
Advertisement Exp. (Rs. In Lakhs)	11	13	14	16	16	15	15	14	13	13
Sales Volume (Rs. In Lakhs)	50	50	55	60	65	65	65	60	60	50

3. Write R script to compute the regression equation of y on x from the following data. Predict the value of y when x=7

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

4. The times taken by a large group of students to complete a piece of homework, T minutes, are Normally distributed with a mean of 57 minutes and standard deviation of 6.5. Find the probability that the time taken by a random student from the group to complete this homework will be less than 60 minutes.

Write R script to Find the probability that the time taken by a random student from the group to complete this homework

a) Will be less than 60 minutes
b) Between 50 and 80 minutes

5. Write R script to perform the following using binomial distribution
   i. If n=4 and p=0.10, find P(x=3)
   ii. If n=12 and p=0.45, find P(5<=x<=7)

6. Perform the following using uniform distribution between 200 and 240
   i. P(x>230)
   ii. P(205≤x≤220)

7. Following are the scores of max vertical jumps before and after the training program. Test whether the training program is helpful to the students (Use Paired t-test). Use α=0.01. Write R script for the above problem.

Player	Max Vertical Jump Before Training Program	Max Vertical Jump After Training Program
Player 1	22	24
Player 2	20	22
Player 3	19	19
Player 4	24	22
Player 5	25	28
Player 6	25	26
Player 7	28	28
Player 8	22	24
Player 9	30	30
Player 10	27	29
Player 11	24	25
Player 12	18	20
Player 13	16	17
Player 14	19	18
Player 15	19	18
Player 16	28	28
Player 17	24	26
Player 18	25	27
Player 19	25	27
Player 20	23	24

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10 Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Cloud Computing(ELECTIVE)**		
Course Code:	**BCABDAES401**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.
- Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit	Description	Hours
1	**Introduction:** Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantages and Disadvantages, and Applications of Cloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**8**

2	**Cloud Architecture:** Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. **Virtualization**-Definition, Features of Virtualization; Types Of Virtualizations-Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Pros and Cons of Virtualization, Technology Example-Microsoft Hyper-V	**8**
3	**Cloud Application Programming and the Aneka Platform**: Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container. **Cloud Applications**: Scientific Applications- Healthcare (ECG Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing);	**10**

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi: "Mastering Cloud Computing Foundations and Applications Programming", Elsevier, 2013

Reference Books:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi: "Mastering Cloud Computing- Foundations and Applications Programming", Elsevier, 2013
2. Barrie Sosinsky:"Cloud Computing Bible", Wiley- India, 2010
3. K Chandrashekaran: "Essentials of Cloud Computing", CRCPress, 2015
4. DerrickRountree,IleanaCastrillo:"TheBasicsofCloudComputing",Elsevier, 2014

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Case Studies examples/ Problem Based Learning/ Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Internet Basics(ELECTIVE)**		
Course Code:	**BCABDAES402**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the fundamentals of HTML5 and its evolution from previous versions.
- Identify the structure and components of an HTML5 document.
- Utilize HTML5 semantic elements to create well-structured web pages.
- Implement multimedia elements such as audio and video using HTML5.
- Demonstrate the use of HTML5 forms and input types for user data collection.
- Apply best practices for web accessibility and SEO in HTML5 documents

Unit	Description	Hours
1	**Introduction to Computers and the Internet**-Introduction, The Internet in Industry and Research, HTML5, CSS3, Demos, Evolution of the Internet and World Wide Web, Web Basics. **Introduction to HTML5:** Introduction, Editing HTML5, First HTML5 Example, W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta Elements. **New HTML5 Form input Types**,input and data list Elements and auto complete Attribute, Page-Structure Elements.	**8**

2	**Cascading Style Sheets**-Introducing CSS ,CSS Rules,CSS Properties, Controlling Fonts, Text Formatting, Pseudo-Classes Selectors ,Lengths, Percentages.	**8**
3	**More Cascading Style Sheets:-**Links, Backgrounds, Lists,Tables, Outlines,:focus and :active Pseudo-Classes.	**10**

Text Books:

1. Deitel, Paul_Deitel, Harvey_Deitel, Abbey - Internet and World Wide Web How to Program-Pearson Education (US) (2011)
2. Jon Duckett -Beginning Web Programming with HTML, XHTML, and CSS (Wrox Beginning Guides)-Wrox (2004)

Reference Books:

1. The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell,2017.
2. Animation in HTML, CSS, and JavaScript, Kirupa Chinnathambi, 1st Edition, Create space Independent Pub, 2013
3. Web Programming with HTML5, CSS, and JavaScript-John Dean

Pedagogy: Lecture/ PPT/ Videos/ / Case Studies examples/ Tutorial/ Activity/ Problem Based Learning / Self Directed Learning etc.

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Object Oriented Analysis and Design(ELECTIVE)**		
Course Code:	**BCABDAES403**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Explain the principles and requirements of OOA and Design
- Describe the object-oriented approach to system development, modeling objects, relationships and interactions.
- Analyze Objects and Classes of the software system.
- Construct object model using object types, attributes, structures and associations.
- Analyze Functional and Dynamic Modeling

Unit	Description	Hours
1	**Introduction** Object orientation concept, OO development concept - Modelling concept, OO methodology, three methods, OO Themes - Abstraction, Encapsulation, combining data & behavior, sharing, Emphasis on the essence of an Object, Synergy **Modeling as a design Technique** Modeling, Abstraction, The three models **Class modeling** Object and class concepts - Objects, Classes, Class diagram, Values & attributes, Operation and methods, Link and Association Concepts - Link and association, Multiplicity, Association and names, Ordering, Bags & Sequences, Association Class, Qualified Association, Generalization and	**8**

	Inheritance- Definition, Use of generalization, Overriding features **Advanced Class Modeling** Multiplicity, Association Ends, Aggregation, Aggregation versus Association, Aggregation versus Composition**.**	
2	**State Modeling** Events - Signal event, change event, Time event, States, Transistors and conditions State Diagrams - Sample State Diagram, one shot state Diagrams, Summary of Basic state diagram notations, State Diagram Behavior - Activity Effects, Do Activities, Entry and Exit Activities, Completion Transition, Sending Signals **Interaction Modelling:** **Use Case Models** Actors, Use Cases, Use case Diagram, Guidelines for use case models **Sequence Model**: Scenarios, Sequence Diagram, Communication Diagram, Activity Model - Activities, Branches, Introduction & termination, Concurrent Activities, Executable Activity diagram, Guidelines for Activity models, Deployment Diagram **Advanced Interaction modeling** Use Case relationships- Include Relationships, Extend Relationship, Generalization, Combinations of use case relationships, Guidelines for use case relationships Procedural Sequence Models- Sequence Diagrams with Passive Objects, Sequence Diagrams with Transient Objects, Guidelines for Procedural Sequence Models	**8**
3	**Class Design** Overview of Class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms - Choosing Algorithms, Choosing Data structures, Defining Internal classes and Operations, Assigning Operations to Classes, Recursing Downward - Functionality Layers, Mechanism Layers, Refactoring, Design Optimization - Adding Redundant associations for Efficient Access, Saving derived values to avoid Re-computation, Rectification of Behavior, Adjustment of Inheritance - Rearranging Classes and Operations, Abstracting out Common Behavior, Using Delegation to share Behavior **Case Study – ATM, Library Management System** (Class	**10**

	Diagram, Object Diagram, Use case Diagram, Sequence Diagram, State Diagram, Activity Diagram)	

Text Book:

1. Object Oriented Modeling and Design with UML Michael R. Blaha James R. Rumbaugh, Second Edition, Pearson

Reference Books:

1. UML™ 2 Tool Kit – Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY Publishing
2. Object Oriented Analysis and Design with Applications Grady Booch Second Edition (Pearson Education)
3. Object Oriented Software Engineering Bernd Brugge and Allen H. Dutoit Pearson Education

Pedagogy: Lecture/ PPT/ Videos/ Animations/ Demonstration/ Concept mapping/ Case Studies examples/ Problem Based Learning etc.,

Program Name	**BCA-DATA ANALYTICS**	Semester	**IV**
Course Title	**Data Analytics using Excel(COMPULSORY)**		
Course Code:	**BCABDASS401**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcome:

After completing this course, a student will be able to:

- Demonstrate data manipulation, analysis, and visualization tasks.
- Create and apply basic and advanced formulas in Excel, including functions
- Develop skills in data analysis techniques such as sorting, filtering, and using PivotTables to summarize and analyze data effectively.
- Utilize Excel tools for tasks such as splitting screens, renaming spreadsheets, and copying and pasting data between spreadsheets.
- Create various types of charts in Excel, and format and customize these charts to effectively present data in real-world scenarios that require strong data analysis and presentation skills.

Unit	Description	Hours
1	**Introduction to Excel:** Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, Formula Bar, Workbook Window, Columns, Rows, Cells, and Formatting. Ranges, Using AutoFill Creating Formulas. **Basic functions** – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum, Advance Formulas	**8**

	Concatenate, Vlookup, Hlookup, Match, Countif, **Charts:** Creating Charts, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table	
2	**Decision Making:** Introduction to IF, nested IF, Introduction to the Data filtering capabilities of Excel, Data Validation, **Data Analysis:** Sorting, Filter, Text to Column, PivotTables Creating PivotTables, manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables Spreadsheet Tools.	**8**
3	**Charts in Excel:** Constructing various Line, Bar, Pie charts, Histograms and Scatter plots. **Multiple Spreadsheets:** Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets.	**10**

Text Books:

1. "Data Analysis Using Microsoft Excel: Updated for Office 365" by Michael Alexander and Richard Kusleika.
2. "Data Analysis with Microsoft Excel: Updated for Office 2007" by Kenneth N. Berk and Patrick Carey.
3. "Excel Data Analysis: Modeling and Simulation" by Hector Guerrero

Pedagogy: Lecture/ PPT/ Videos/ Demonstration/ Concept mapping/ Case Studies examples/ Problem Based Learning/ Game Based Learning/ Group Discussion/ Self Directed Learning etc.

Questions Paper for Pattern Core Subjects

Duration:3 Hours Max.Marks:80

Note: Answer any ten Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 10*2=20

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

Part-B

UNIT-I, II, III,IV

Each unit contain main questions and it carry 15 Marks.
Each main questions contain 2 or more sub question.

4*15=60

UNIT-I

2.

a.
b.
c.

3.

a.
b.
c.

Questions Paper Pattern forElective and Compulsory Subjects

Duration:2Hours Max.Marks:40

Note: Answer any 5 Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 5*2=10

a.
b.
c.
d.
e.
f.
g.
h.

Part-B

Answer any six questions out of Nine questions.

6*5=30

2.
3.
4.
5.
6.
7.
8.
9.
10.

MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BACHELOR OF COMPUTER APPLICATIONS
BCA-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programmes

[BCA, BCA (A.I and M.I), BCA (D.A)]

Semester	Course 1	Course 2	Course 3	Elective / Optional	Language	Compulsory	Total Credits	Total Working hour
I	5 (3T+2P)	5 (3T+2P)	5 T		3+3	2	23	4+4+4+4+5+4+4+2=31
II	5 (3T+2P)	5 (3T+2P)	5T		3+3	2	23	4+4+4+4+5+4+4+2=31
III	5 (3T+2P)	5 (3T+2P)	5T	2	3+3		23	4+4+4+4+5+4+4+2=31
IV	5 (3T+2P)	5 (3T+2P)	5T	2	3+3	2	25	4+4+4+4+5+2+4+4+2=33
V	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]			2	26	3+3+4+3+3+4+3+3+4+2=32
VI	3T	3T	3T	3T	Research Methodology + Project work 12		24	3+3+3+3+24=36
Total Credits for the Programme							**144**	

Note:

- Course1 and Course2: I to IV Semester: Theory 3 credits = 4 contact hours and Practical 2 credits=4 contact hours
- Course3: I to IV Semester: Theory 5 credits = 5 contact hours
- Course1, Course2 and Course3: V and VI Semester: Theory 3 credits = 3 contact hours and Practical 2 credits = 4 contact hours
- Elective/Optional: 2 credits=2 contact hours
- Languages: 3 credits=4 contact hours
- Compulsory: 2 credits=2 contact hours

CURRICULUM STRUCTURE FOR III AND IV SEMETER
BCA- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Semester III								
Sl. No	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1		LANGUAGE-I	Lang	4	80	20	100	3
2		LANGUAGE-II	Lang	4	80	20	100	3
3	BCAAIMS301	Object Oriented Programming using Java	Core	4	80	20	100	3
4	BCAAIMS302	Operating System	Core	4	80	20	100	3
5	BCAAIMS303	Computer Network	Core	5	80	20	100	5
6	BCAAIPS304	Object Oriented Programming Lab	Practical	4	40	10	50	2
7	BCAAIPS305	Operating System Lab	Practical	4	40	10	50	2
8	BCAAIES301 BCAAIES302 BCAAIES303	A) Digital Marketing B) Web Content Management System C) DEVOPS	Elective	2	40	10	50	2
			Sub - Total	31	520	130	650	23

Semester IV								
Sl. No	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week	SEE	IA	Total Marks	Credits
1		LANGUAGE-I	Lang	4	80	20	100	3
2		LANGUAGE-II	Lang	4	80	20	100	3
3	BCAAIMS401	Artificial Intelligence-I	Core	4	80	20	100	3
4	BCAAIMS402	Python Programming	Core	4	80	20	100	3
5	BCAAIMS403	Software Engineering	Core	5	80	20	100	5
6	BCAAIPS404	Artificial Intelligence-I Lab	Practical	4	40	10	50	2
7	BCAAIPS405	Python Programming Lab	Practical	4	40	10	50	2
8	BCAAIES401 BCAAIES402 BCAAIES403	A) Cloud Computing B) Object Oriented Analysis and Design C) Digital Image Processing	Elective	2	40	10	50	2
9	BCAAISS401	Internet Basics	Compulsory	2	40	10	50	2
			Sub - Total	33	640	160	800	25

Pedagogy: Lecture / PPT / Videos / Demonstration / Concept mapping / Case Studies examples / Tutorial / Problem Solving / Trouble shooting

SEMESTER III

SEMESTER III

Program Name	BCA-AIML	Semester	III
Course Title	**Object Oriented Programming using JAVA (THEORY)**		
Course Code:	**BCAAIMS301**	No.of Credits	03
Contact hours	52 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the features of JAVA and the architecture of JVM
- Write, compile, and execute JAVA programs that may include basic data types and control flow constructs and how type casting is done Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance
- The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language
- Write, compile, execute JAVA programs that include GUIs

Unit	Description	Hours
1	**Fundamentals of Object-Oriented Programming:** Introduction, Object Oriented Paradigm, Basic Concepts of OOP, Benefits and Applications of OOP. **Introduction to JAVA:** JAVA Features, JAVA Environment, Simple JAVA Program, JAVA Program Structure, JAVA Tokens, JAVA Statements, JAVA Virtual Machine. **JAVA Programming Basics:** Constants, Variables, Data Types, Declaration of variables, Giving values to the variable, Scope of variables, Symbolic constants, Type casting. **Operators and Expressions:** Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operator, Increment and Decrement Operators, Conditional Operator, Special Operators. **Using I/O:** Byte streams and character streams, predefined streams, reading console input, reading characters, strings, writing console output. **Decision Making and Branching:** Simple if statement, if..else statement, nesting of if..else, the else..if ladder, the Switch statement.	**13**
2	**Decision making and Looping** -The while statement, the do statement, the for statement . Jumps in loops, Labelled loops.	**13**

	Class and Objects - Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, the 'this' keyword, Overloading Methods, Using Objects as Parameters, Returning Objects, Recursion, Understanding 'static', Introducing 'final ', Using Command-Line Arguments, Varargs : Variable-Length Arguments **Arrays and Strings:** One dimensional arrays, Creating an array, Two dimensional arrays, Strings	
3	**Inheritance** - Inheritance Basics, using 'super', Creating Multilevel hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance. **Packages and Interfaces** - Packages, Access protection in packages, Importing Packages, Interfaces. **Exception Handling** - Exception Handling Fundamentals – Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, finally, JAVA's built-in Exceptions **Multithreaded Programming-** Introduction, Creating threads, Extending the thread class, stopping and blocking thread, Life cycle of a thread.	**13**
4	**Event and GUI programming: Event Handling** - The delegation event model, Event Classes –ActionEvent, KeyEvent and MouseEvent Classes, Event Listener Interfaces –ActionListener, KeyListener and MouseListener interfaces. **Introducing Swing** – two key swing features, components and containers, the swing packages, a simple swing application **Exploring Swing-** Jlabel, JTextField, JButton, Checkboxes , Radio buttons , Jlist , JComboBox.	**13**

Textbooks :

1. E Balagurusamy, Programming with JAVA – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Herbert Schildt, JAVA: The Complete Reference, 7th Edition, MGH Publication.

Reference Books:

1. Herbert Schildt, JAVA 2-The Complete Reference, Fifth Edition, McGraw Hill publication.
2. Cay S. Horstmann, Core JAVA Volume I–Fundamentals, Prentice Hall.
3. Somashekara, M.T., Guru, D.S., Manjunatha, K.S, Object Oriented Programming with JAVA, EEE Edition, PHI.

Program Name	BCA-AIML	Semester	III
Course Title	**Operating System (THEORY)**		
Course Code:	**BCAAIMS302**	No.of Credits	03
Contact hours	52 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the fundamentals of the operating system.
- Comprehend multithreaded programming, process management, process synchronization, memory management and storage management.
- Compare the performance of Scheduling Algorithms
- Identify the features of I/O and File handling methods.

Unit	Description	Hours
1	**Introduction:** Operating System, Simple Batch Systems, Multi programmed Batched Systems, Time Sharing Systems, Real-Time Systems, Multi-processor Systems. **System Components, Operating System Services. Process:** Process Concept, Process Scheduling, Cooperating Process, **Threads** (Thread Concept, Single and Multiple Threads, Benefits): **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms.	**13**
2	**Process Synchronization**: Introduction Race Condition, Critical Section, Semaphores; Synchronization in Linux. **Deadlocks:** Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	**13**
3	**Memory Management.** Logical versus Physical Address Space, Swapping, Contiguous Allocation (Memory Allocation, Fragmentation), Paging (Basic Method), Segmentation (Basic Method). **Virtual Memory.** Demand Paging, Page Replacement, Page Replacement Algorithms, Thrashing (concept). **File System.** File Concept, Access Methods	**13**

	Disk Scheduling (I/O Management): Introduction and Scheduling Algorithm	
4	**Linux files system**, login and logout. **Linux commands:** Directory oriented command, wild card characters, File oriented commands, File Access Permissions, Process oriented commands, Background processing, Communication oriented commands, General purpose commands, **Pipe and Filter** related commands, **vi editor, Shell programming**,	**13**

Text Books:

1. Abraham Silberschartz and Peter Galvin, **Operating System Concepts** ,6th edition,TMH
2. K.L. James, **Linux: Learning the Essentials**, PHI learning private limited,2011
3. B Mohammed Ibrahim, **Linux: A Practical Approach**, FireWallMedia,2009

Reference Books:

1. Andrew S Tanenbaum, **Operating System Design and Implementation**, PHI
2. Milan Milenkovic, **Operating Systems**, TMH
3. Cristopher Negus, Dreamtech, **RedHatLinux9 Bible**, Wiley Publication
4. Shital Vivek Ghate , Operating System Concepts and Basic Linux Commands ; Educreation Publishing.
5. Richard Fox , LINUX with Operating System Concepts, CRC PressMark
6. G Sobell, "**A Practical Guide to Linux**", PEARSON Publishers

Program Name	BCA-AIML	Semester	III
Course Title	**Computer Networks(THEORY)**		
Course Code:	**BCAAIMN303**	No.of Credits	05
Contact hours	60 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks in real world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.

Unit	Description	Hours
1	**Introduction:** Uses of Computer Networks-Business Applications, Home Applications, Mobile Users, Social Issues; Network Hardware-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks. Network Software- Reference Models-the OSI Reference Model, The TCPIP Reference Model, A Comparison of the OSI and TCP/IP Reference Models.	**15**
2	**The Physical Layer**-Transmission Media-Twisted-Pair, Coaxial Cable, Fiber Optics, Multiplexing (FDM, TDM) Switching **Data Link Layer:** Design Issues-Services Provided to the Network Layer, Framing, Error Control, Flow Control, Error Detection and Correction, Error correcting codes, Error detecting Codes.	**15**
3	**The Network Layer:** Network Layer design issues, Store and Forward Packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram. Internetworking-How Networks can be connected, Connectionless Internetworking, Tunnelling, Internetwork Routing, Fragmentation. The Network Layer in the Internet-the IP Protocol, IP Addresses, OSPF, BGP, Internet Multicasting, IPv6.	**15**

4	**The Transport Layer**: The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols-Addressing, Connection Establishment, Connection Release. The Internet Transport Protocols-UDP-Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; TCP-Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. **The Application Layer-DNS**-The DNS Name Space, Resource Records, Name Servers. Electronic Mail-Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery;	**15**

Text Book:

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.

Reference Books:

1. Data Communication and Networking, Behrouza A Forouzan, 3rd Edition, Tata McGraw Hill, 2001.
2. Data and Computer Communications, William Stallings, 10th Edition, Pearson Education, 2017.
3. Data Communication and Computer Networks, Brijendra Singh, 3rd Edition, PHI, 2012.
4. Data Communication and Network, Dr. Prasad, Wiley Dreamtech.

Program Name	**BCA-AIML**	Semester	**III**
Course Title	**Object Oriented Programming Lab using JAVA**		
Course Code:	**BCAAIMPS304**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Write a Program to Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
2. Write a Program to Program to input Start and End limits and print all Fibonacci numbers between the ranges.(Use for loop)
3. Design a class: ShowRoom with the following description:
   Instance variables / Data members:
   String name — To store the name of the customer
   long mobno — To store the mobile number of the customer
   double cost — To store the cost of the items purchased
   double dis — To store the discount amount
   double amount — To store the amount to be paid after discount
   Member methods:
   ShowRoom() — default constructor to initialize data members
   void input() — To input customer name, mobile number, cost
   void calculate() — To calculate discount on the cost of purchased items, based on following criteria

Cost	Discount
Less than or equal to ₹10000	5%
More than ₹10000 and less than or equal to ₹20000	10%
More than ₹20000 and less than or equal to ₹35000	15%
More than ₹35000	20%

   void display() — To display customer name, mobile number, amount to be paid after discount. Write a main method to create an object of the class and call the above member methods. [Class Basics]

4. Write a Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum ( ) to add two distances by using objects as method arguments and show the result. (Input and output of inches should be less than 12.).
5. Write a Program to create a class “Matrix” that would contain integer values having varied numbers of columns for each row. Print row-wise sum.
6. Define a class to accept a String and print the number of digits, alphabets and special characters in the string.

   Example: S = "Kapil Dev@83"
   Output:

   Total number of characters - 12
   Number of digits – 2
   Number of upper-case alphabets – 2

   Number of lower-case alphabets - 6
   Number of Special characters – 1

7. Write a Program to add, remove and display elements of a Vector

PART-B

1. Create a class named 'Member' having data members: Name, Age, PhoneNumber, Place and Salary. It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherit the 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same. [inheritance]

2. Write a Program to implement the following class hierarchy: Student: id, name StudentExam (derived from Student): Marks of 3subjects, total marks StudentResult (derived from StudentExam) : percentage, grade Define appropriate methods to accept and calculate grade based on existing criteria and display details of N students

3. Write a Program to calculate marks of a student using multiple inheritance implemented through interface
   Create a class called student with
   a) Data members namely, name and regno for keeping Name and RegNo of a Student

b) Member functions namely, getdata() and putdata() for initializing and displaying the contents of data members

Create a class called mark which inherits the properties of student class with

a) Data members namely, m1, m2 and m3 for keeping marks of three subjects

b) Member functions namely, getmarks( ) and putmarks( ) for initializing and displaying the contents of data members

Create an Interface Student, with a final data member pract_mark for keeping practical mark and initialize it and member method putPractMarks() to display it

Create a class called Result which inherits the properties of mark class and implements the interface student, with Data member total and Member function display( ) for computing total marks and checking whether a student is passed or failed in based on each subject. The display() function computes the total marks as total=m1+m2+m3+pract_mark. It checks for the condition ((m1 > 40) && (m2 > 40) && (m3 > 40) && (pract_mark > 20)). If the condition is True, then print that the result as PASS else print that the result as FAIL.

4. Write a Program to create an abstract class named shape that contains two integers, and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends the class shape. Each one of the class contains only the method printArea() that print the area of the given shape.[Abstract class]

5. Create a package named FINANCE to encapsulate functionality for calculating compound interest and simple interest. Within the FINANCE package, define a class containing a method to calculate compound interest. Also, within the FINANCE package, define another class containing a method to calculate simple interest.

   Create a package EKYC to encapsulate for account holders profile creation. Within EKYC package define class PERSONAL_INFO containing members(Name, Adhar number ,PAN, Mobile number and Address) and methods(input () and print()). Also within EKYC package define a class ACCOUNT_INFO containing members(ACCOUNT_NUM, CUSTOMER_ID, BALANCE) and methods(input () and print()).

   Create a main class BANK that resides outside the FINANCE AND EKYC package. Inside the main method, invoke the respective methods from the packages to perform the interest calculations and display all the details of bank customer.

6. Write a Program that creates a user interface to perform basic integer operations such as addition, subtraction, multiplication and division. The user enters two numbers in the TextFields - Num1 and Num2. The result of operations must be displayed in the ResultTextField when the operation(+ or – or x or /) button is

clicked. Appropriate Exception handling message to be displayed in the Result TextField when Num1 or Num2 is not an integer or Num2 is Zero when division operation is applied.

7. Using the swing components, design the frame for shopping a book that accepts book code, book name, and Price. Calculate the discount on code as follows.

Code	Discount rate
101	15%
102	20%
103	25%
Any other	5%

Find the discount amount and Net bill amount. Display the bill.

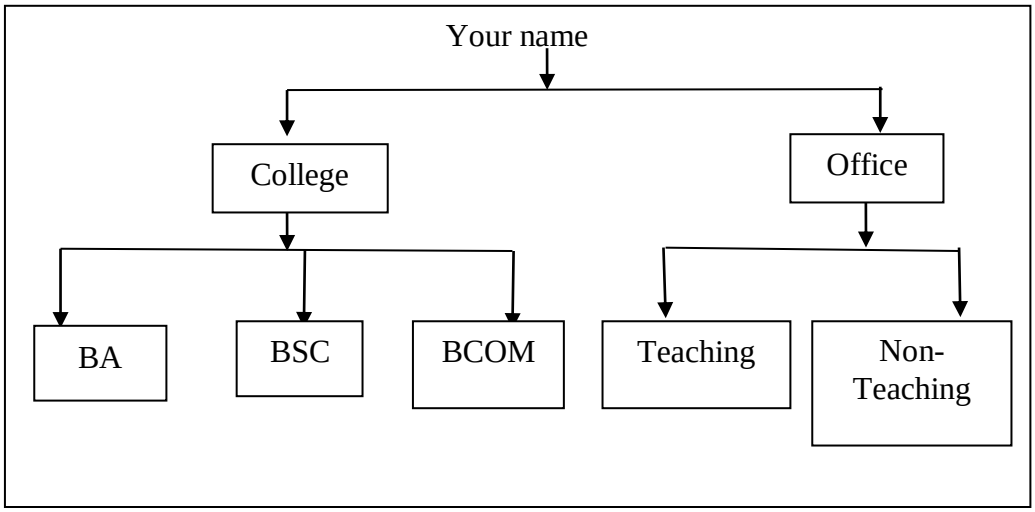
Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A:Writing:5 Marks Execution:3Marks	15 Marks
Program-2	PART-B:Writing:8 Marks Execution:4Marks	20 Marks
Practical Record		05 Marks
Total		40Marks

Program Name	**BCA-AIML**	Semester	**III**
Course Title	**Operating System Lab**		
Course Code:	**BCAAIMP305**	No.of Credits	02
Contact hours	52 Hours	Duration of SEA/Exam	3 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

PART-A

1. Use Linux commands to create the directory structure and perform the listed actions.



   a) Put one file each inside the directories BA, BCom, Teaching and Non-Teaching with meaningful content.
   b) Goto BA directory and then move its file to non-teaching directory.
   c) Change the directory to non-teaching from root directory using only single command.
   d) From BA copy the content to B.Com. Delete BA directory recursively
2. Consider the above directory structure. Write and execute Linux commands to
   a) List the files in long format. Starting from root directory including sub directory contents
   b) Count how many files exist in office directory.
   c) Display the present path.

d) Display current date in the form MM/DD/YY HH:MM:SS

3. Write a Linux shell script to create a file which contains students' information such as Rollno, Name, Gender, class (BCA, BSc, BCom) and Total marks.
    a) Append the 2 more records.
    b) Display the contents.
    c) Display the records of only BSc course and sort on reverse order of name and store in BSCnew.txt.
    d) Display the contents of BSCnew.txt
    e) Rename the student.dat to stud.dat
4. Using the above stud.dat file, Write Linux shell scripts to
    a) Add the following permission
        i. Execute for user.
        ii. Remove write permission for group
        iii. Check the changes in the permission by listing the file.
    b) Select only the female names and store in female.dat and male names to male.dat
    c) Combine these names from both the files .Show the new file.
    d) Change the case of alphabets of the contents in male.dat.
    e) List all the files that start with "B" in the current directory.
5. Write a Linux shell script to Accept 'n' and check whether the number is a prime or not.
6. Write a Linux shell script to Accept 'n' and find the sum of the series 1!+3!+5!.....+n!.
7. Write a Linux shell script to Display all natural numbers between two integers and also find their sum.

PART B

1. Write a shell script to accept 'n' integers and count the positive, negative integers and zeros separately. Also find the sum of the positive and negative integers separately.
2. Write a shell script to accept many characters and count individual vowels, digits, spaces, special characters and consonants.
3. Write a Linux shell script to accept student name and marks in 3 subjects through command line arguments. Find Total marks, Average marks and Result(PASS if marks in each subject is more than or equal to 40 and FAIL if mark in any subject is less than 40) Grade (depending on average marks).
4. Write a Linux shell script to Accept a word and check whether it begins with lowercase vowel or uppercase vowel, ends with a digit or whether it is a three-letter word.
5. Write a menu driven shell script for the following.

a) Display the current working directory.
b) Rename a file(check for the existence of the source file)
c) List the users logged in.
d) Append the contents of a file to another file(display the message if the file doesn't exist in the directory).

6. Write a menu driven shell script for the following.
   a) Rename a file (check for the existence of the source file)
   b) List all file names/ directory names in the present working directory which has the specified pattern
   c) List of directory having all the permission
   d) List only files names in long format.
7. Write a shell script to accept many filenames through command line. Do the following for each filename
   a) If it is an ordinary file, display its content and also check whether it has Execute permission.
   b) If it is directory, display the number of files in it.
   c) If the file/directory does not exist, display a message

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:5 Marks Execution:3Marks	15 Marks
Program-2	PART-B Writing:8 Marks Execution:4Marks	20 Marks
Practical Record		05 Marks
Total		40Marks

Program Name	BCA-AIML	Semester	**III**
Course Title	**Digital Marketing (ELECTIVE)**		
Course Code:	**BCAAIMES301**	No.of Credits	02
Contact hours	26 Hours	Duration of SEA/Exam	2 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the fundamental concepts and principles of digital marketing.
- Develop practical skills to implement various digital marketing strategies and techniques
- Analyze and evaluate the effectiveness of digital marketing campaigns.
- Create comprehensive digital marketing plans and strategies.

Unit	Description	Hours
1	**Introduction to Digital Marketing:** Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms **Digital Marketing Strategy and Planning:** Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation. Campaign planning and execution, Monitoring and adjusting digital marketing campaigns	**8**
2	**Social Media Marketing:** Overview of social media marketing, social media platforms and their features, Creating and optimizing social media profiles, social media content strategy, social media advertising and analytics **Email Marketing:** Introduction to email marketing, building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics.	**8**
	Mobile Marketing: Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics	

3	**Analytics and Reporting:** Importance of analytics in digital marketing, setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization	**10**

Text Book:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by
   Simon Kingsnorth.

Reference Books:

1. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White
2. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi
3. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles
4. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

Program Name	BCA-AIML	Semester	**III**
Course Title	**Web Content Management System(ELECTIVE)**		
Course Code:	**BCAAIMES302**	No.of Credits	02
Contact hours	26 Hours	Duration of SEA/Exam	2 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand content development basics.
- Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting.
- Host websites and develop content for social media platforms such as wiki and blog
- Understand e-publications and virtual reality .
- Understand the use of e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	Web Content Development and Management, Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing.	**8**
2	Web Hosting and Managing Multimedia Content, Creating and Maintaining a Wiki Site. Presentation Software Part , Screen casting Tools and Techniques, Multilingual Content Development.	**8**
3	Planning and Developing Dynamic Web Content Sites, Website Design Using CSS Creating and Maintaining a WIKI Site, Creating and Managing a Blog Site. Content Management System: Joomla Content Management System: Drupal	**10**

Text Books:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.
2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
3. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Program Name	**BCA-AIML**	Semester	**III**
Course Title	**DEVOPS (ELECTIVE)**		
Course Code:	**BCAAIMES303**	No.of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the scalable VDI environment, addressing challenges such as boot storms and hardware limitations.
- Understand how to apply various DevOps tools to streamline and automate the software development lifecycle, including infrastructure as code and deployment automation.
- Understand how to utilize cloud services (IaaS, PaaS, Hybrid Cloud) to enhance DevOps practices, enabling full-stack deployments and efficient resource management.
- Understand how to integrate DevOps with ALM processes to improve the development, deployment, and management of mobile and multi-tier applications, scaling Agile methodologies across the enterprise.

Unit	Description	Hours
1	**Introduction to DevOps:** Business needs for DevOps, Business values for Devops, How DevOps works. **DevOps Capabilities:** Paths to DevOps Adoption, Plan, Devlop/Test, Deploy, Operate **Adopting DevOps:** Where to Begin, People in DevOps, Process in DevOps, Technology in DevOps	**8**
2	**Using Cloud in DevOps:** Cloud as DevOps enabler, Full Stack Deployments, cloud service model for DevOps, Hybrid Cloud **Using DevOps to solve Challenges:** Mobile applications,	**8**

	ALM processes, Scaling Agile, Multiple Tier Applications, DevOPs in the enterprise, Supply Chains, IOT. **DevOps Case Study:** Executive's Role, putting together a team, setting DevOps Goals, learning from the DevOps transformation, looking at the DevOps results. **DevOps Myths.**	
3	**Basics of DevOps tools:** Git, Jenkins, Git lab, Docker, Kubernetes, Ansible, Terraform, Grafana, Sonar Qube	**10**

Textbooks:

1. Real-World DevOps Practices Paperback – 17 October 2024 by B. Thangaraju – Wiley Publishers, 2024
2. "DevOps For Dummies" by Sanjeev Sharma and Bernie Coyne. 2nd IBM Limited edition.

Reference Books:

1. Learning DevOps - Second Edition: A comprehensive guide to accelerating DevOps culture adoption with Terraform, Azure DevOps, Kubernetes, and Jenkins By: Mikael Krief (Author) | Publisher: Packt Publishing Limited
2. DevOps For Beginners: A Step-By-Step Guide To DevOps Best Practices By: Liam Foster
3. Learning DevOps: Jenkins, Kubernetes, Terraform, Azure DevOps. Jenkins, M. K. Packt Publishing Limited.
4. Joakim Verona (2016).Practical DevOps. Packt Publishing Limited
5. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology" by Gene Kim, Jez Humble, Patrick Debois, John Willis
6. The Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win" by Kim, Behr, Spafford

SEMESTER IV

SEMESTER IV

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Artificial Intelligence – I(THEORY)**		
Course Code:	**BCAAIMS401**	No.of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Identify and describe different types of intelligent agents and their environments, and implement basic agent-based systems.
- Formulate problems and apply both uninformed and informed search strategies to solve them.
- Represent knowledge using propositional and first-order logic and perform inference using these representations.
- Understand and implement fundamental machine learning algorithms such as linear regression, decision trees, and neural networks.
- Demonstrate knowledge of advanced AI topics, including reinforcement learning, natural language processing, and robotics.
- Analyze and discuss the ethical considerations and societal impacts of AI technologies.

Unit	Description	Hours
1	**Introduction-** What is AI, Foundations of Artificial Intelligence, History of Artificial Intelligence, State of the Art. **Intelligent Agents:** Agents and Environments, Good Behavior: The Concept of Rationality, Nature of Environments, Structure of Agents.	**13**
2	**Solving Problems by Searching**: Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Avoiding Repeated States, Searching with Partial Information	**13**

	Informed Search and Exploration: Informed (Heuristic) Search Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems	
3	**Logical Agents:** Knowledge –Based Agents, The Wumps World, Logic, Propositional Logic: A Very Simple Logic, Reasoning Patterns in Propositional Logic, Effective propositional inference, Agents Based on Propositional Logic. **First Order Logic:** Representation Revisited, Syntax and Semantics of First Order Logic, Knowledge Engineering in First-Order Logic. **Inference in First-Order Logic:** Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining.	**13**
4	**Planning** –The Planning Problem, Planning with State-Space Search, Partial-Order Planning, Planning Graphs, Planning with Proposition Logic, Analysis of Planning Approaches. **Applications of AI** - Natural Language Processing, Text Classification and Information Retrieval, Speech Recognition , Image processing and computer vision, Robotics	**13**

Text Book:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson Education, 2003

Reference Books:

1. Tom Mitchell, "Machine Learning", 1st Edition, McGraw-Hill,2017
2. Elaine Rich, Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition,

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Python Programming (THEORY)**		
Course Code:	**BCAAIMS402**	No.of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving file handling.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop the emerging applications of relevant fields using Python.

Unit	Description	Hours
1	**Introduction to Python-** Features of Python, Flavors of python, Python Virtual machine, Memory management, Garbage Collection, Comparison between Python and C, JAVA and Python, Installing Python for Windows, Writing and executing Python program. **Python Basics**: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Association, Data Types, Indentation, Comments, Console Input and Console Output, Type Conversions. **Input and Output**: Input/output Statements, Command line arguments. **Control Statements** – if, if..else, if..elif, while loop, for loop, else suite, break, continue, assert, return Statements **Arrays in Python**- Creating arrays, importing array module, Indexing and slicing on arrays, types of arrays, working with arrays using numpy.	**13**

2	**Functions** – Functions and methods, Defining, calling functions, returning multiple values, formal and actual parameters, Keyword argument Default arguments and variable argument, Local and Global variables, Anonymous functions and Lambdas, Decorators, and Generators, matrices in numpy, matrix functions, random numbers **Strings**: Creating and Storing Strings, Accessing Sting Characters; the str()function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing, Python String Methods **Lists**: Creating Lists, Operations on Lists, Built-in Functions on Lists, Implementation of Stacks and Queues using Lists, Nested Lists **Dictionaries**: Creating Dictionaries, Operations on Dictionaries, Built-in Functions on Dictionaries, Dictionary Methods, Populating and Traversing Dictionaries. **Tuples and Sets**: Creating Tuples, Operations on Tuples, Built-in Functions on Tuples, Tuple Methods, Creating Sets, Operations on Sets, Built-in Functions on Sets, Set Methods.	**13**
3	**File Handling**: File Types, Operations on Files– Create, Open, Read, Write, Close Files, File Names and Paths **Classes and Objects**-Defining classes and Objects, constructors, types of methods and variables, Inner classes. **Inheritance and Polymorphism**: Type of Inheritance, super () method, method overloading and Overriding, Operator Overloading **Exception Handling** –Type of exceptions, assert Statement, Except Block, User defined exceptions, logging the exceptions. **Regular expressions**: Sequence characters, Quantifiers and Special characters in regular expressions.	**13**
4	**Graphical User Interface**: Root window, font and colors, Canvas and frames. Widgets: Button, Label, Message, Text, Scrollbar, Checkbutton, Radiobutton, Entry, Spinbox, Listbox and Menu, Creating Tables. **Database Connectivity**: Types of databases used with Python, Using MySQL from Python, Retrieving and Inserting, updating and deleting data in a table, Creating Database tables through Python. Using Oracle database from	**13**

	Python Stored Procedures **Data Science Using Python**: Introduction, Data Frame, Data Visualization, Machine Learning	

Text Books:

1. Dr. R. Nageswara Rao, Core Python Programming (2nd ed.). DreamTech Press.
2. Gowrishankar S., and Veena A. (2019). Introduction to Python Programming. CRC Press.
3. Dr. R. Nageswara Rao,(2021). Core Python Programming (3rd ed.). DreamTech Press.

Reference Books:

1. Brown, M. C. (2018). Python: The complete reference. McGraw Hill Education
2. Summerfield, M. (2010). Programming in Python 3: A complete introduction to the Python language (2nd ed.). Addison-Wesley.
3. Zelle, J. M. (2010). Python programming: An introduction to computer science (2nd ed.). Franklin, Beedle and Associates Inc.
4. Lutz, M. (2013). Learning Python (5th ed.). O'Reilly Media.
5. Matthes, E. (2019). Python crash course: A hands-on, project-based introduction to programming (2nd ed.). No Starch Press.
6. Ramalho, L. (2015). Fluent Python: Clear, concise, and effective programming. O'Reilly Media.

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Software Engineering (THEORY)**		
Course Code:	**BCAAIMS403**	No.of Credits	**05**
Contact hours	**60 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
- An ability to work in one or more significant application domains.
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
- Demonstrate an ability to use the techniques and tools necessary for engineering practice.

Unit	Description	Hours
1	**Introduction:** The Software Problem, Software Engineering Problem, The Software Engineering Approach. **Software Processes:** Software Process, Characteristics of a Software Process, Software Development Process, Waterfall Model, Prototyping, Iterative Enhancement, Spiral Model, Project Management Process, Phases of management process, Metrics, Measurement, and Models, Software Configuration Management Process, Configuration Identification, change control, Status accounting and auditing, Process Management Process, Building estimation models, Process Improvement and maturity.	**15**

2	**Software Requirements Analysis and Specification:** Software Requirements, Need for SRS, Requirement process, Problem Analysis, Analysis Issues, Informal Approach, Structured Analysis, Prototyping, Requirements Specification, Characteristics of an SRS, Components of an SRS, Specification Languages, Structure of a Requirements Document, Validation, Requirement Reviews. **System Design**: Design Principles, Module-Level Concepts, Design Notation and Specification, Data Flow Diagrams, Structured Design Methodology, Verification.	**15**
3	**Detailed Design:** Module specification, specifying functional module, Detailed design, PDL, Logic/Algorithm Design, Verification, Design Walkthroughs, Critical Design Reviews, Consistency checkers. **Coding:** Programming Practice, Top-Down and Bottom-Up, Structured Programming, Information Hiding, Programming Style, Internal Documentation, Verification, Code Reading, Static Analyses, Symbolic Execution, Proving Correctness, Code Inspections or Reviews, Unit Testing.	**15**
4	**Testing and Maintenance:** Testing Fundamentals, Error, Fault, and Failure, Test Oracles, Top-Down and Bottom-Up Approaches, Test Cases and Test Criteria, Psychology of Testing, Functional Testing, Equivalence class partitioning, Boundary value analysis, Cause effect graphing, Structural Testing, Control flow-based criteria, Data flow-based testing, Preventive and Corrective Maintenance. **Introduction to Testing tools:** Features of Test tools, Guidelines for selecting a tool, Tools and skills of testers, Types of testing tools, Difficulties while introducing new tools, Process of procurement of COTS.	**15**

Text Books:

1. Pankaj Jalote, **An Integrated Approach to Software Engineering**, 2nd Edition, Narosa Publishing House, 2004
2. M G Limaye, **Software Testing- Principles, Techniques and Tools**, McGraw Hill Education, 2009

Reference Books:

1. Waman S Jawadekar-Software Engineering Principles and Practice,Tata McGrawHill,2004
2. Roger S. Pressman, **Software Engineering: A Practioner's Approach**, McGraw Hill, 2009

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Artificial Intelligence -I Lab**		
Course Code:	**BCAAIMPS404**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution:3Marks**	**15 Marks**
Program-2	**PART-B** **Writing:8 Marks Execution:4Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40Marks**

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Python Programming Lab**		
Course Code:	**BCAAIMPS405**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Write a program create list with N elements. find all unique elements in the list. If an element is found only once in the list, then add that element to the unique list.
2. Write a Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Consider a tuple t1= (1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
    a) Print half the values of tuple in one line and the other half in the next line.
    b) Print another tuple whose values are even numbers in the given tuple.
    c) Concatenate a tuple t2= (11,13,15) with t1.
    d) Return maximum and minimum value from this tuple.
4. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
5. Write a program to create a text file and compute the number of characters, words and lines in a file.
6. Program using user defined exception class that will ask the user to enter a number until he guesses a stored number correctly. To help them figure it out, a hint is provided whether their guess is greater than or less than the stored number using user defined exceptions.
7. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
   Sample Python dictionary data and list labels: exam_data = {'name': ['Asha', 'Disha', 'Risha', 'Sasha', 'Nisha', 'Prisha', 'Usha', 'Raasha', 'Felisha', 'Jisha'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']} labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

a) Write a Pandas program to display a summary of the basic information about the specified DataFrame and its data
b) Write a Pandas program to select the rows where the number of attempts in the examination is greater than 2

PART-B

1. Program to create a class Employee with empno, name, depname, designation, age and salary and perform the following function
    i) Accept details of N employees
    ii) Search given employee using empno
    iii) Display employee details in neat format

2. Write a program menu driven to create a BankAccount class. class should support the following methods for
    i) Deposit
    ii) Withdraw
    iii) GetBalanace .

    Create a subclass SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest.

3. Write a GUI program to implement Simple Calculator

4. Create a table student table (regno, name and marks in 3 subjects) using MySQL and perform the followings
    a. To accept the details of students and store it in database.
    b. To display the details of all the students
    c. Delete particular student record using regno.

5. Create a table employee (empno, name and salary) using MySQL and perform the followings
    a) To accept the details of employees and store it in database.
    b) To display the details of a specific employee
    c) To display employee details whose salary lies within a certain range

6. Create a table electricity_bill(TariffCode, Customer_Name, Meter Number, Previous_Reading and Current_Reading) using MySQL and perform the Following:
    a) To accept the details of customers and store it in database.
    b) To Update the customer details by Meter Number.
    c) Calculate Bill of a particular customer using below criteria.

Tariff Code	Units Consumed	Rate/Unit
LT1	0-30	2.0
	31-100	3.5
	101-200	4.5
	Above 200	5.0
LT2	0-30	3.5
	31-100	5.0
	101-200	6.0
	Above 200	7.5

7. Consider following data and draw the bar graph using matplot library.(Use CSV or Excel).Add the data Using GUI.

Batsman	**2017**	**2018**	**2019**	**2020**
Virat Kohli	2501	1855	2203	1223
Steve Smith	2340	2250	2003	1153
Babar Azam	1750	2147	1896	1008
Rohit Sharma	1463	1985	1854	1638
Kane Williamson	1256	1785	1874	1974
Jos Butler	1125	1853	1769	1436

Display appropriate title for axis and chart. Also show legends.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	PART-A Writing:5 Marks Execution:3Marks	15 Marks
Program-2	PART-B Writing:8 Marks Execution:4Marks	20 Marks
Practical Record		05 Marks
Total		40Marks

Program Name	BCA-AIML	Semester	IV
Course Title	Cloud Computing (ELECTIVE)		
Course Code:	BCAAIMES401	No.of Credits	02
Contact hours	26Hours	Duration of SEA/Exam	2 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):

- After the successful completion of the course, the student will be able to:
- Explain the core concepts of the cloud computing paradigm such as how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- Apply the fundamental concepts in data centres to understand the trade-offs in power, efficiency and cost.
- Identify resource management fundamentals like resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

Unit	Description	Hours
1	**Introduction:** Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantages and Disadvantages, and Applications of Cloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.	**8**
2	**Cloud Architecture:** Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud.	**8**

	Virtualization-Definition, Features of Virtualization; Types Of Virtualizations-Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Pros and Cons of Virtualization	
3	**Cloud Application Programming and the Aneka Platform**: Aneka Cloud Application Platform- Framework Overview, Anatomy of the Aneka Container. **Cloud Applications**: Scientific Applications- Healthcare (ECG Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing);	**10**

Textbooks:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi: "Mastering Cloud Computing Foundations and Applications Programming", Elsevier, 2013

Reference Books:

1. Barrie Sosinsky:"Cloud Computing Bible", Wiley- India, 2010
2. K Chandrashekaran: "Essentials of Cloud Computing", CRCPress, 2015
3. Derrick Rountree, Ileana Castrillo:"The Basics of Cloud Computing", Elsevier, 2014

Program Name	BCA-AIML	Semester	IV
Course Title	Object Oriented Analysis and Design(ELECTIVE)		
Course Code:	BCAAIMES402	No.of Credits	02
Contact hours	26 Hours	Duration of SEA/Exam	2 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Explain the principles and requirements of OOA and Design
- Describe the object-oriented approach to system development, modeling objects, relationships and interactions.
- Analyze Objects and Classes of the software system.
- Construct object model using object types, attributes, structures and associations.
- Analyze Functional and Dynamic Modeling

Unit	Description	Hours
1	**Introduction:** Object orientation concept, OO development concept - Modeling concept, OO methodology, three methods, OO Themes - Abstraction, Encapsulation, combining data and behavior, sharing, Emphasis on the essence of an Object, Synergy **Modeling as a design Technique:** Modelling, Abstraction, The three models **Class modelling:** Object and class concepts - Objects, Classes, Class diagram, Values and attributes, Operation and methods, Link and Association Concepts - Link and association, Multiplicity, Association and names, Ordering, Bags and Sequences, Association Class, Qualified Association, Generalization and Inheritance- Definition, Use of generalization, Overriding features	8
2	**State Modelling :**Events - Signal event, change event, Time event, States, Transistors and conditions State Diagrams - Sample State Diagram, one shot state Diagrams, Summary of Basic state diagram notations, State	8

	Diagram Behavior - Activity Effects, Do Activities, Entry and Exit Activities, Completion Transition, Sending Signals **Sequence Model**: Scenarios, Sequence Diagram, Communication Diagram, Activity Model - Activities, Branches, Introduction and termination, Concurrent Activities, Executable Activity diagram, Guidelines for Activity models, Deployment Diagram	
3	**Class Design** Overview of Class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms - Choosing Algorithms, Choosing Data structures, Defining Internal classes and Operations, Assigning Operations to Classes, Recursing Downward - Functionality Layers, Mechanism Layers, Refactoring, Design Optimization - Adding Redundant associations for Efficient Access, Saving derived values to avoid Re-computation, Rectification of Behavior, Adjustment of Inheritance - Rearranging Classes and Operations, Abstracting out Common Behavior, Using Delegation to share Behavior	**10**

Text Book

1. Object Oriented Modeling and Design with UML Michael R. Blaha James R. Rumbaugh, Second Edition, Pearson

Reference Books

1. UML™ 2 Toolkit – Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY Publishing
2. Object Oriented Analysis and Design with Applications Grady Booch Second Edition (Pearson Education)
3. Object Oriented Software Engineering Bernd Brugge and Allen H. Dutoit Pearson Education

Program Name	BCA-AIML	Semester	IV
Course Title	Digital Image Processing (ELECTIVE)		
Course Code:	BCAAIMES403	No.of Credits	02
Contact hours	26Hours	Duration of SEA/Exam	2 Hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Remember the fundamental concepts of Image Processing
- Explain different Image enhancement techniques
- Understand and review image transforms
- Analyse and evaluate digital images.

Unit	Description	Hours
1	**Introduction:** What is Digital image processing, The origin of DIP, Examples of fields that use DIP, Fundamentals steps in DIP, Components of an image processing system. **Digital Image Fundamentals:** Elements of Visual perception, Light and the electromagnetic spectrum, Image sensing and acquisition, Image sampling and Quantization, Some Basic relationship between Pixels	**8**
2.	**Image Enhancement in the Spatial Domain:** Background, some basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic / Logic operations, Basics of spatial filtering, Smoothing Spatial Filters, Sharpening spatial filters.	**8**
3	**Color Image Processing:** Color Fundamentals, Colour Models, Pseudocolor Image Processing, Colour transformations, Smoothing and Sharpening, Color Segmentation, Noise in Color Images	**10**

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition, PHI/Pearson

Reference Books:

1. B. Chanda, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.
2. Nick Efford, "Digital Image Processing a practical introducing using JAVA", Pearson Education, 2004.
3. Kothari, Ashish M, Digital Image Processing using SCILAB, Springer publication, 2019.

Program Name	**BCA-AIML**	Semester	**IV**
Course Title	**Basic Web Designing Skills (Compulsory)**		
Course Code:	**BCAAIMSS401**	No.of Credits	**02**
Contact hours	**26Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

- After completing this course satisfactorily, a student will be able to:
- Understand the fundamentals of HTML5 and its evolution from previous versions.
- Identify the structure and components of an HTML5 document.
- Utilize HTML5 semantic elements to create well-structured web pages..

Unit	Description	Hours
1	**Introduction to Computers and the Internet**-Introduction, The Internet in Industry and Research,HTML5, CSS3,Demos,Evolution of the Internet and World Wide Web, Web Basics. **Introduction to HTML5:**Introduction,Editing HTML5,First HTML5 Example,W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking ,meta-Elements. **New HTML5 Form input Types**, input and Datalist Elements and autocomplete Attribute, Page-Structure Elements.	10
2	**Cascading Style Sheets**-Introducing CSS, Where You Can Add CSS Rules, CSS Properties-Controlling Fonts, Text Formatting, Text Pseudo-Classes, Selectors, Lengths, Percentages.	8
3	**More Cascading Style Sheets:-**Links, Backgrounds, Lists, Tables, Outlines.	8

Text Books:

1. Deitel, Paul_Deitel, Harvey_Deitel, Abbey - Internet and World Wide Web How to Program-Pearson Education (US) (2011)
2. Jon Duckett -Beginning Web Programming with HTML, XHTML, and CSS (Wrox Beginning Guides)-Wrox (2004)

Reference Books:

1. The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell, 2017.
2. Animation in HTML, CSS, and JAVA Script, Kirupa Chinnathambi, 1st Edition, CreateSpace Independent Pub, 2013

Questions Paper for Pattern Core Subjects

Duration:3 Hours Max.Marks:80

Note: Answer any TEN Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 10*2=20
   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h.
   i.
   j.
   k.
   l.

PART B

Each unit contain two main questions, and it carry 10 Marks. Each main questions contain 2 or more sub question.

3*10=30

UNIT-I

2.
   a.
   b.
   c.

3.
   a.
   b.

UNIT-II

4.
   a.
   b.
   c.

5.
   a.
   b.
   c.

UNIT-III

6.
   a.
   b.
   c.

7.
   a.
   b.
   c.

UNIT-IV

8.
   a.
   b.
   c.

9.
   a.
   b.

Questions Paper Pattern for Elective and Compulsory Subjects

Duration:2Hours Max.Marks:40

Note: Answer any 5 Questions from Part-A. And one full Questions from each unit in Part-B

Note: Answer any Five Questions from Part-A. And any six Questions out of Nine Questions from Part-B

Part-A

1. 5*2=10
   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h.

Part-B

Answer any Six questions out of Nine questions.

6*5=30

2.
3.
4.
5.
6.
7.
8.
9.
10.

MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BCA

BACHELOR OF COMPUTER APPLICATIONS

MANGALORE UNIVERSITY

Suggested programme structure for the Under Graduate Programmes

[BCA, BCA (A.I & M.L), BCA (D.A)]

Semester	**Course 1**	**Course 2**	**Course 3**	**Elective / Optional**	**Course**	**Language**	**Compulsory**	**Total Credit**	**Total Working hour**
I	5 (3T+2P)	5 (3T+2P)	5 T			3+3	2	23	4+4+4+4+5+4+4+2=31
II	5 (3T+2P)	5 (3T+2P)	5T			3+3	2	23	4+4+4+4+5+4+4+2=31
III	5 (3T+2P)	5 (3T+2P)	5T	2		3+3		23	4+4+4+4+5+4+4+2=31
IV	5 (3T+2P)	5 (3T+2P)	5T	2		3+3	2	25	4+4+4+4+5+2+4+4+2=33
V	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]				2	26	3+3+4+3+3+4+3+3+4+2=32
VI	3T	3T	3T		3T	Project work 12		24	3+3+3+3+24=36
Total Credits for the Programme								**144**	

Note:

- **Course1 and Course2: I to IV Semester: Theory 3 credits=4 contact hours & Practical 2 credits=4 contact hours**
- **Course3: I to IV Semester: Theory 5 credit=5 contact hours**
- **Course1, Course2 and Course3: V and VI Semester: Theory 3 credits=3 contact hours & Practical 2 credits=4 contact hours**
- **Elective/Optional: 2 credits=2 contact hours**
- **Languages: 3 credits=4 contact hours**
- **Compulsory: 2 credits=3 contact hours**

CURRICULUM STRUCTURE FOR III AND IV SEMETER BCA

Semester III								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**Language-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**Language-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCACACS301**	Database Management System	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCACACS302**	C# and Dotnet Framework	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCACACS303**	Computer Networks	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCACAPS304**	DBMS-Lab	**practical**	**4**	**40**	**10**	**50**	**2**
7	**BCACAPS305**	C# and Dotnet Framework -Lab	**practical**	**4**	**40**	**10**	**50**	**2**
8	**BCACAES301**	A) Open Source Tools B) Web Content Management System C) DEVOPS	**Elective**	**2**	**80**	**20**	**100**	**2**
Sub - Total				**31**	**560**	**140**	**700**	**23**

Semester IV								
Sl. No	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**Language-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**Language-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCACACS401**	Python Programming	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCACACS402**	Advanced JAVA and J2EE	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCACACS403**	Operating System Concepts	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCACAPS404**	Python Programming-Lab	**practical**	**4**	**40**	**10**	**50**	**2**
7	**BCACAPS405**	Advanced JAVA and J2EE-Lab	**practical**	**4**	**40**	**10**	**50**	**2**
8	**BCACAES401**	A) Distributed Computing B) Object Oriented Analysis & Design C) Digital Image Processing	**Elective**	**2**	**80**	**20**	**100**	**2**
9	**BCACASS401**	Basic Web Designing Skills.	**Compulsory**	**2**	**80**	**20**	**100**	**2**
Sub - Total				**33**	**640**	**160**	**800**	**25**

SEMESTER III

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Database Management System (Theory)**		
Course Code:	**BCACACS301**	No. of Credits	**03**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and design ER diagrams for given real-world problems.
- Represent ER model to relational model and its implementation through SQL.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

Unit	Description	Hours
	Database Architecture: Introduction to Database system applications. Characteristics, Data models, Database schema, Database architecture, Data independence, Database languages, GUIs, and Classification of DBMS.	

1	**E-R Model**: E-R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, Roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E-R diagram.	**13**
2	**Relational Data Model**: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. **Data Normalization**: Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	**13**
3	**Interactive SQL**: Table fundaments, oracle data types, CREATE TABLE command, Inserting data into table, Viewing Data in the table, sorting data in a table, Creating a table from a table, Inserting data into a table from another table, Delete operations, Updating the contents of a table, Modifying the structure of tables, Renaming tables, destroying tables, displaying table structure. **Data Constraints**: Types of data constraints, IO constraints- The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints- NULL value concepts NOT NULL constraints, CHECK constraint, DEFAULT VALUE concepts. **Computations on Table Data**: Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function- Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL, Group By clause, Having clause, subqueries, JOINS, Using the UNION, INTERSECTION, MINUS clause	**13**
4	**Introduction To PL/SQL**: Advantages of PL/SQL, The Generic PL/SQL Block, PL/SQL The character set, Literals, PL/SQL datatypes, variables, Logical comparisons, comments. Control Structure - Conditional Control, Iterative Control **PL/SQL Transactions**: Cursor-Types of Cursors, Cursor	**13**

	Attributes. Explicit cursor- Explicit cursor Management, cursor for loop **PL/SQL Database Objects**: Procedures and Functions, Oracle Packages, Trigger, Error Handling in PL/SQL.	

Text Book:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. Oracle and PL/SQL by Ivan Bayross, BPB publications.

Reference Books:

1. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
2. Introduction to Database System, C J Date, Pearson, 1999.
3. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S. Sudarshan, 6th Edition, McGraw Hill, 2010.
4. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA- GENERAL**	Semester	**III**
Course Title	**C# and Dotnet Framework (Theory)**		
Course Code:	**BCACACS302**	No. of Credits	**03**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- To learn about basic features .NET Framework.
- To understand concepts about C#
- To create an ASP.NET application using standard .NET Controls
- To learn about connecting data sources using ADO.NET and managing them.

Unit	Description	Hours
1	**Overview of .NET Framework and Introduction to C#:** Origin of .Net Technology, .NET Framework, Components of the .NET Framework, Common Language Runtime (CLR), Common type system, Common Language Specifications (CLS), Managed code and assemblies, Intermediate Language (IL) and Just-In-Time (JIT) Compilation, .NET Framework of base Classes, Visual Studio.Net, Benefits of .NET approach# and .Net **Introduction to C#:** Overview of C# language features, Namespaces, Structure of a C# program, Literals, Variables and Datatypes, Operators and expressions, Decision making and branching, Decision making and looping, Methods and Strings	13
	Classes and Objects in C#: Defining Class, Adding members and methods, member access modifiers, Accessing	

2	class members, Constructors, types of constructors in C#, constant members and read only members **Inheritance and Polymorphism:** Defining subclass, visibility control, Sub class constructors, Multilevel inheritance, Method overriding, Abstract classes, Operation Polymorphism, Interfaces- implementing interfaces Delegates- Delegate declaration, delegate methods, Delegate instantiation, Delegate invocation, Managing errors and exceptions	13
3	**Graphical user interface with Windows forms:** Visual Studio.net, Components of Visual Studio, Introduction to Windows forms, event handling, simple event driven GUI, control properties and layout, anchoring & docking, windows form controls: Label, Textbox, Buttons, groupbox, panel, checkbox, Radio Buttons, Picture box, Tooltips, NumericUpDown control, Mouse and Keyboard Event Handling. Creating Menus, Month Calendar Control, Datetime Picker Control, Linked Label control, Listbox, Checked Listbox, Combo Box control. Creating MDI forms, MDI parent and child forms. User Defined Controls	13
4	**ADO.NET database Programming with C#:** Overview of ADO.NET, Data providers and their classes, ADO.NET datasets, working with data sources and datasets, handling data errors, working with data bound controls binding textbox and combo box to data source, working with data GridView control, working with connection, command and data reader objects **Web based Application on .NET** - ASP.net, Standard web controls – Text, Button, Hyperlink, dropdownlist & image. Validation Controls. Creating simple web application using ASP.NET	13
Text Books 1. E Balagurusamy Programming in C#, A Premier, Third Edition 2. C# 2010 for Programmers Paul Deitel and Harvey Deitel Fourth Edition 3. ADO.NET database programming with C#, Anne Boehm, & Ged Mead		

Reference Books:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. “ASP.NET and VB.NET Web Programming”, Matt J. Crouch, Edition 2012.
3. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA- GENERAL**	Semester	**III**
Course Title	**Computer Networks (Theory)**		
Course Code:	**BCACACS303**	No. of Credits	**05**
Contact hours	**60 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks in real world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.

Unit	Description	Hours
1	**Introduction:** Uses of Computer Networks and its Applications- Business Applications, Home Applications, Mobile Users, Social Issues. **Network Hardware**-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network software **Reference Models**-The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP Reference Models.	**15**
2	**The Physical Layer**: Transmission Media-Twisted Pair, Coaxial Cable, and Fiber Optics. Wireless Transmission-Radio Transmission, Microwave Transmission, Infrared, Light Transmission. Multiplexing- Frequency division, time division.	**15**

	The Data Link Layer: Data link layer design issues-Services Provided to the Network Layer, Framing, Error Control, and Flow Control. Error Detection and Correction-Error-Correcting Codes, Error –Detecting Codes.	
3	**The Network Layer**: Network layer design issues-Store- and-Forward Packet Switching, Services Provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-Oriented Service. Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing, Approaches to Congestion Control, The IP Version4 Protocol, IP Address, IP Version 6.	**15**
4	**The Transport Layer:** The Transport Service-Services Provided to the Upper Layers. Elements of Transport Protocols-Addressing, Connection Establishment, and connection Release. The Internet Transport Protocols-(TCP and UDP)-UDP-Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. **The Application Layer**: DNS–Domain Name System-The DNS Name Space, Name Servers. Electronic Mail-Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.	**15**

Text Book:

1. Computer Networks, Andrew S. Tanenbaum, 5thEdition, Pearson Education,2010.

Reference Books:

1. Data Communication & Networking, Behrouza A Forouzan, 3rd Edition, Tata Mc GrawHill, 2001.
2. Data and Computer Communications, William Stallings, 10thEdition, Pearson Education,2017.
3. Data Communication and Computer Networks ,Brijendra Singh, 3rd Edition, PHI,2012.
4. Data Communication & ,Dr.Prasad, Wiley Dreamtech.

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**DBMS-Lab**		
Course Code:	**BCACAPS304**	No. of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Create a table EMPLOYEE using SQL command to store details of employees such as EMPNO, NAME, DESIGNATION, DEPARTMENT, GENDER and SALARY. Specify Primary Key and NOT NULL constraints on the table. Allow only 'M' or 'F' for the column GENDER. DEPARTMENT can be SALES, ACCOUNTS, IT. Choose DESIGNATION as CLERK, ANALYST, MANAGER, ACCOUNTANT and SUPERVISOR that depends on department

   Write the following SQL queries:

   a) Display *EMPNO, NAME* and *DESIGNATION* of all employees whose name ends with RAJ.
   b) Display the details of all female employees who is earning salary within the range 20000 to 40000 in SALES or IT departments
   c) List the different DEPARTMENTs with the DESIGNATIONs in that department.
   d) Display the department name, total, average, maximum, minimum salary of the DEPARTMENT only if the total salary given in that department is more than 30000.
   e) List the departments which have more than 2 employees.

2. Create a table CLIENT to store CLIENT_NO, NAME, ADDRESS, STATE, BAL_DUE. Client no must start with 'C'. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records.

Write the following SQL queries:

a) From the table CLIENT, create a new table CLIENT1 that contains only CLIENT_NO and NAME , BAL_DUE from specified STATE. Accept the state during run time.
b) Create a new table CLIENT2 that has the same structure as CLIENT but with no records. Display the structure and records.
c) Add a new column by name PENALTY number (10, 2) to the CLIENT
d) Assign Penalty as 10% of BAL_DUE for the clients C1002, C1005, C1009 and for others 8%. Display Records
e) Change the name of CLIENT1 as NEW_CLIENT
f) Delete the table CLIENT2

3. Create a table BOOK using SQL command to store Accession No, TITLE, AUTHOR, PUBLISHER, YEAR, PRICE. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table.Insert 10 records.

Write the following SQL queries:

a) List the details of publishers having 'a' as the second character in their names.
b) Display Accession No., TITLE, PUBLISHER and YEAR of the books published by the specified author before 2010 in the descending order of YEAR. Accept author during run time
c) Modify the size of TITLE to increase the size 5 characters more.
d) Display the details of all books other than Microsoft press publishers.
e) Remove the records of the books published before 1990.

4. Create a table SALES with columns SNO, SNAME, MNO , JOIN_DATE, DATE_BIRTH, SALARY,SALES_AMOUNT and COMMISSION. Minimum age for joining the company must be 18 Yrs. Default value for Commission should be 0. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records with data except commission. Manager of Manager can be NULL.

Write the following SQL queries:

a) Display the details of Sales Persons whose salary is more than Average salary in the company.
b) Update commission as 20% of Sales Amount.
c) Display SNO, SNAME, MNO, SALARY, COMMISSION, MANAGER_SALARY of the sales persons getting sum of salary and commission more than salary of manager.(Self join)
d) Display the records of employees who finished the service of 10years

5. Create a table Sales_Details with the columns SNO, MONTH, TARGET and QTY_SOLD to store the Sales Details of one year. Specify the composite primary key to the columns SNO and MONTH. TARGET and SALES must be positive numbers.

Write the following SQL queries:

a) Display the total sales by each sales person considering only those months sales where target was reached
b) If a commission of RS.50 provided for each item after reaching target, calculate and display the total commission for each sales person.
c) Display the SNO of those who never reached the target.
d) Display the SNO, MONTH and QTY_SOLD of the sales persons with SNO S0001 or S0003

6. Create the following tables by identifying primary and foreign keys. Specify the not null property for mandatory keys.
SUPPLIERS(SUPPLIER_NO,SNAME,SADDRESS,SCITY)
COMPUTER_ITEMS(ITEM_NO,SUPPLIER_NO,ITEM_NAME, IQUANTITY)
Consider three suppliers. A supplier can supply more than one type of items.

Write the SQL queries for the following:

a) List ITEM and SUPPLIER details in alphabetical order of city name and in each city decreasing order of IQUANTITY.
b) List the name ,city,and address of the suppliers who are supplying keyboard.

c) List the supplier name, items supplied by the suppliers 'Cats' and 'Electrotech'.
d) Find the items having quantity less than 5 and insert the details of supplier and item of these, into another table NEWORDER

7.Create the following tables by identifying primary and foreign keys, specify the not null property for mandatory keys.

PRODUCT_DETAIL				
P_NO	**PRODUCTNAME**	**QTYAVAILABLE**	**PRICE**	**PROFIT %**
P0001	Monitor	10	3000	20
P0002	Pen Drives	50	650	5
P0003	CD Drive	100	10	3
P0004	Key Board	25	600	10

PURCHASED_DETAIL		
CUSTNO	**P_NO**	**QTYSOLD**
C1	P0003	2
C2	P0002	4
C3	P0002	10
C4	P0001	3
C1	P0004	2
C2	P0003	2
C4	P0004	1

Write the following SQL queries:

a) Display total amount spent by C2.
b) Display the names of product for which either QtyAvailable is less than 30 or total QtySold is less than 5(USE UNION).
c) Display the name of products and quantity purchased by C4.
d) How much Profit does the shopkeeper gets on C1's purchase?
e) How many 'Pen Drives' have been sold?

PART B

1. Create a table Bank with the columns ACNO, ACT_NAME, ACT_TYPE and BAL. Specify the Primary Key. Initial BAL must be greater than 500.

   Write a PL/SQL program to perform debit operation by providing acct_no and amount required. The amount must be greater than 100 and less than 20000 for one transaction. If the account exist and BAL-amount>500 Bank table must be updated, otherwise "NO SUFFFICIENT BALANCE" message should be displayed. If account number is not present then display "NO SUCH ACCOUNT" message to the user.

2. Create a table STOCK_DETAIL with the columns PNO, PNAME and QTY_AVL to store stock details of computer accessories. Specify Primary Key and NOT NULL constraints on the table. QTY_AVL should be positive number.

   Write a PL/SQL Program to define a user defined exception named "LOW_STOCK" to validate the transaction. The program facilitates the user to purchase the product by providing product number and quantity required. It should display an error message "NO SUFFICIENT STOCK" when the user tries to purchase a product with quantity more than QTY_AVL, Otherwise the STOCK_DETAIL table should be updated for valid transaction.

3. Write a PL/SQL program to compute the selling price of books depending on the book code and category. Use Open, Fetch and Close. The Book_detail table contains columns: Book Code, Author, Title, Category and Price. Insert 10 records. The selling price=Price-Discount.

   The discount is calculated as follows:

Book Code	Category	Discount Percentage
A	Novels	10% of Price
	Technology	12.5% of Price
B	Commerce	18% of Price
	Science	19% of Price
C	Songs	25% of Price
	Sports	24% of Price
D	All	28% of Price

Print the result in tabular form with proper alignment

Book Code category title author price discount % discount amount sell price

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4. Write a PL/SQL program to display employee pay bill (using Cursor For loop) Use a Procedure to receive basic pay and to compute DA, HRA, Tax, PF, Gross Pay and Net Pay(Use OUT). Base table contains the following columns empnum, empname, basic pay. Insert 3 records.

   Allowances are computed as follows.

Basic Pay	DA	HRA
<=20000	35% of Basic	8% of Basic
>20000 & <=30000	38%	9%
>30000 & <=40000	40%	10%
>40000	45%	10%

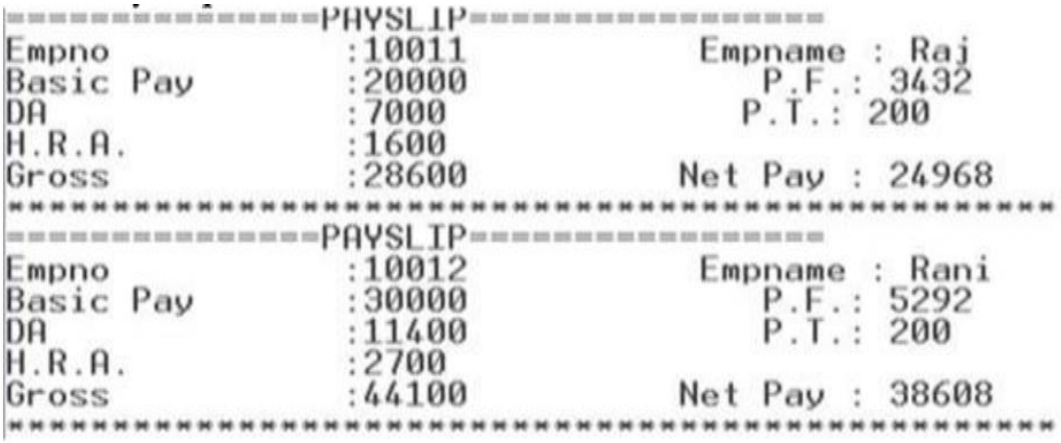
   Gross=Basic+DA+HRA

   PF=12% of Gross or Rs. 2000 whichever is minimum.

   PT=Rs. 100 upto Gross is 25,000 else Rs. 200.

   Net=Gross-(PF+PT)

   Print Pay slip as follows



5. Given the following tables: ITEM_MASTER(itemno, name, stock, unit_price) [Apply the Primary key and check constraint for stock and price as >0] [Insert 5 records] ITEM_TRANS(itemno, quantity and trans_date)

   Create a **package** PCK_ITEM includes a function CHK_ITEM and a procedure PROC_ITEM.

   Function CHK_ITEM gets one argument itemno and is used to check whether the parameter itemno exists in ITEM_MASTER and should return 1 if exist. Otherwise 0 and displays proper message.

   Procedure PROC_ITEM gets two arguments itemno and quantity, and is used to perform the following if item exists. If required quantity is not available, give appropriate message. If available , insert a record of this transaction to ITEM_TRANS and modify the stock in ITEM_MASTER.

   Write a PL/SQL program to accept ITEM_NO and Quantity needed of required item. Use Package to do the transaction process(Transaction date can be current date). OUTPUT to be shown as follows:

```
Enter value for accept_itemno: 1
old   5:           X:=&accept_itemno;
new   5:           X:=1;
Enter value for quantity: 3
old   6:         M:=&quantity;
new   6:         M:=3;
Item :aa   Quantity  :3  Price  :15 Total Amount  :45
```

6. Create a package which includes a function to compute the factorial of a number, a procedure to compute the value of nCr, and another procedure to compute nPr both uses the factorial function. Execute the package program for the required calculation

7. Create a trigger to update the MASTER table when a record is inserted into SALES table and create another trigger to update the MASTER table when a record is inserted or updated or deleted in NEWSTOCK table. Assume the suitable columns for all the tables.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**C# and Dotnet Framework -Lab**		
Course Code:	**BCACAPS305**	No. of Credits	**02**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART A

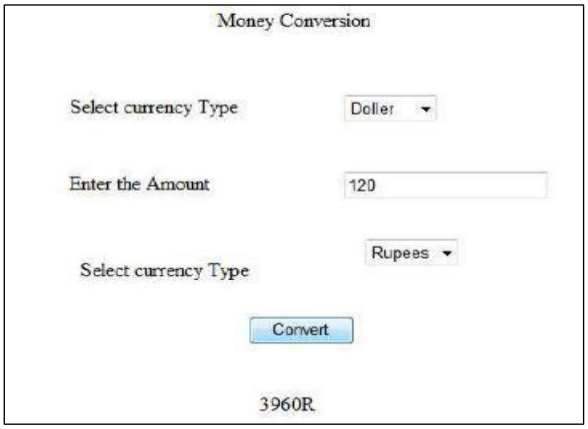
1. Write a C# program to which reads a set of strings and then print the string having highest number of vowels.

2. Write a C# program to create a lists Topics. The values are
   Topics ={"Introduction to C#", "Variables", "Data Types", "Loops", "If statements", "Jump Statements", " Class & Object", "Inheritance", "Constructors"}. Using switch case statements categorise the topics as "Basic", "Control Flow" and "OOPs Concepts"
   Sample Output:
   Topic is Introduction to C#;Category is Basic
   Topic is Variables ;Category is Basic
   Topic is Data Types; Category is Basic
   Topic is Loops; Category is Control Flow
   Topic is If Statements; Category is Control Flow
   Topic is Jump Statements; Category is Control Flow
   Topics is Class & Object; Category is OOPs Concept
   Topic is Inheritance; Category is OOPS Concept

3. Write a C# Sharp program to make such a pattern like a right-angled triangle with the number increased by 1.
   The pattern like :
   1
   2 3
   4 5 6
   7 8 9 10

4. Write a Program in C# to find addition and Multiplication operation on two complexnumber using operator overloading.

5. Create an application that allows the user to enter a number in the textbox named 'getnum'. Check whether the number in the textbox 'getnum' is palindrome or not. Print the message accordingly in the label control named lbldisplay when the user clicks on the button 'check'.
6. Design a Webpage of a Hotel which display different Menu as per the Time of Visit.
7. Write a program to perform money conversion



PART B

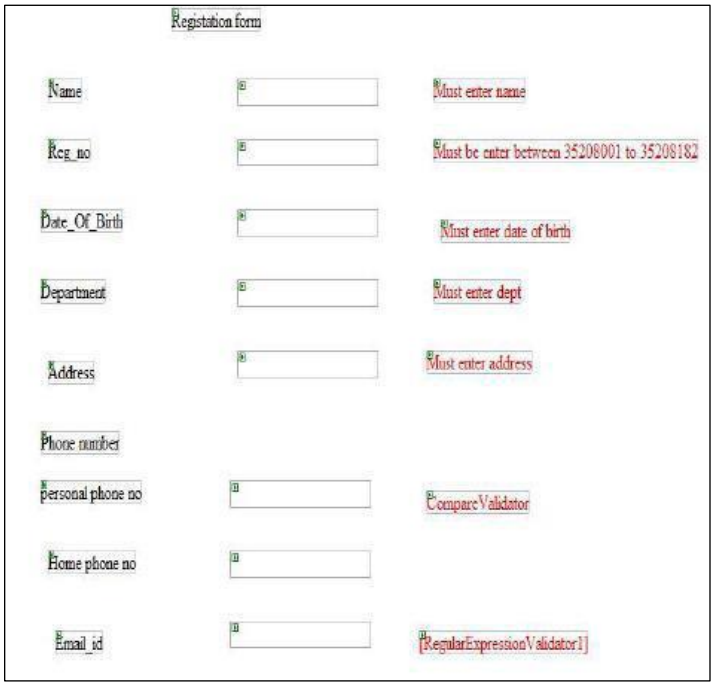
1. Create a web application that uses the AdRotator control to display a list of three advertisements using an XML file. Each ad must have an image, a navigation link,

and alternate text. Also display one paragraph information about the advertisement below the AdRotator

2. Write a Program in C# define a Class "Salary" which will contain member variable Emp_no,Emp_name,Dob Basic Write a program using constructor. And method to calculate the DA, HRA, PF, IT, GROSS and NETPAY using appropriatecondition.

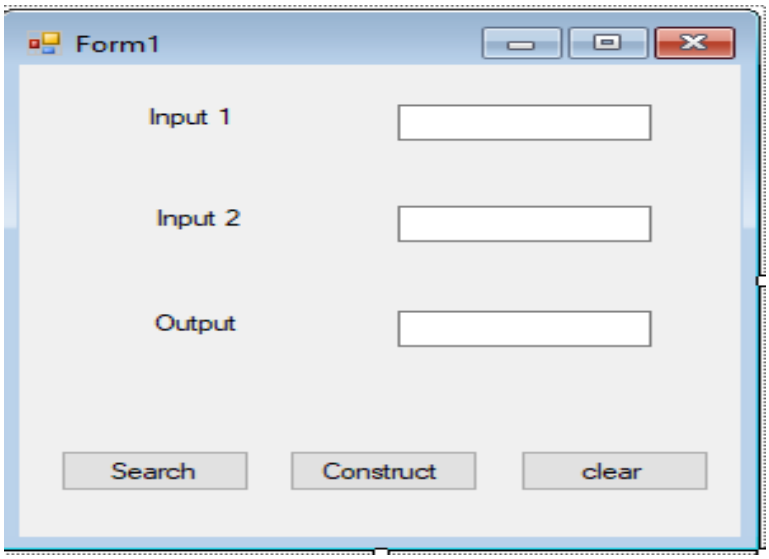
   If Basic <= 20000 D.A is 40% Basic H.R.A is 10% Basic.
   P.F 12% of Gross; PT is Rs .100
   If Basic.> 20000 D.A is 50% Basic. H.R.A 15% Basic.
   P.F 12% of Gross ; PT is Rs.150
   Gross = Basic.+D.A +HRA and Net = Gross -PT –PF

3. Write an application that receives the following information from a set of students: Student Id ,Student Name, Course Name, and Date of Birth. The application should also display the information of all the students once the data is Entered. Implement this using an Array of Structures.
4. Create a Web Form for Login Module which adds a Username and Password to the database. The username in the database should be a primary key
5. Design a Admission form with client-side validations



6. Design a webpage to enter Student information such as Student no, Student Name, marks in 3 subjects. Use the following buttons for,
    - Add -> for adding the record to the database (Insert at least 5 records). Calculate total, %, grade and store it.
    - Display – Display the records from the database

7. Create ASP .NET web application with the given user interface to input two strings(str1,str2) and performs two operations "Search" and Construct" by clicking respective buttons. The result of both operations shall be displayed on Output TextBox.
   SERACH: If the user clicks on "Search" button then appearance of str2 is searched in str1 and removed from str1. Also, the characters if str1, before and after str2 are concatenated together. Ignore the cases where there is no character in str1 before or after the str2.



Input and Outputs:
Sample1:
str1: hardmetalironissmoothwhenheatedhard
str2: hard
Output: metalironissmoothwhenheated
Sample2:
str1: mylifelessonsarebestlifequotes
str2: life
Output: mylessorsarebestquotes
CONSTRUCT: If user clicks on "Construct" button then the concatenation of first character of str1, the first character of str2, second character of str1, second

character of str2 and so on.., is performed to create the new string. The remaining characters at the end of str1or str2 are concatenated to the end of the resultant string.

Input and Outputs:

Sample1:

str1: Welcome

str2: Csharp

Output: WCeslhcaormpe

CLEAR: clear button should clear all the TextBoxes.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Open Source Tools (Elective)**		
Course Code:	**BCACAES301**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the concept of Open-Source software.
- Know the benefits and challenges of using Open-Source tools.
- Use Open-Source tools for development and deployment.
- Make informed decisions about Open-Source tool selection.

Unit	Description	Hours
1	**Open Source Software:** **Open Source Tools**: Introduction to Open sources, Need of Open Sources, Open Source –Principles, Standard Requirements, Advantages of Open Sources. **Free Software** – FOSS	8

	Licenses – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues **Application of Open Sources:** Open-Source Operating Systems: FEDORA, UBUNTU	
2	**Programming Tools and Techniques:** i. Usage of design Tools like Argo UML or equivalent ii. Version Control Systems like Git or equivalent iii. Bug Tracking Systems (Trac, BugZilla) i. BootStrap	**8**
3	**Case Studies**: Apache ii. Berkeley Software Distribution iii. Mozilla (Firefox) iv. Wikipedia v. Joomla vi. GNU Compiler Collection vii. Libre Office	**10**

Text Book:

1. Kailash Vadera, Bhavyesh Gandhi, "Open-Source Technology", Laxmi Publications Pvt. Ltd 2012, 2nd Edition.

Reference Book:

1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy", Cambridge Universities Press 2007

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Web Content Management System (Elective)**		
Course Code:	**BCACAES302**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand content development basics.
- Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting ‘
- Host websites and develop content for social media platforms such as wiki and blog
- Understand e-publications and virtual reality
- Use of e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	**Web Content Management System**: Introduction, Types of CMS, Difference between WCMS and CMS, WCMS-Features, Advantages, Disadvantages, Types of WCMS, Content Types and Formats, Content Tools (Media-wise), Needs and Guidelines of Content Development.	**8**
2	**Static website and dynamic website**- Features, Differences; **Dynamic Web content sites :**Creating Dynamic Web Content, **Web Hosting and Managing Multimedia Content:** Types of web hosting- advantages and disadvantages, Importance of web hosting, features , steps to host a website; Multimedia content – Benefits, Best practices for creation of multimedia contents, Basic multimedia contents.	**8**

3	**WIKI SITE** – Characteristics, Working, Advantages; **Multilingual Content Development**- Key features, Advantages, Developing multilingual content, Creating multilingual content in WordPress, **Content Management System** – Joomla, WordPress, Drupal; **E- Publication Concept** – Introduction, models/approaches, categories, e-publishing tools.	**10**

Text Books:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.
2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
3. Using Joomla: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**DEVOPS(Elective)**		
Course Code:	**BCACAES303**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Design and manage a scalable VDI environment, addressing challenges such as boot storms and hardware limitations.
- Apply various DevOps tools to streamline and automate the software development lifecycle, including infrastructure as code and deployment automation.
- Utilize cloud services (IaaS, PaaS, Hybrid Cloud) to enhance DevOps practices, enabling full-stack deployments and efficient resource management.
- Integrate DevOps with ALM processes to improve the development, deployment, and management of mobile and multi-tier applications, scaling Agile methodologies across the enterprise.
- Define the roles of executives and teams in setting DevOps goals, expanding Agile practices, leveraging test automation, and building efficient delivery pipelines.
- Critically analyze and debunk common myths about DevOps, highlighting its applicability across various industries, including ITIL shops, regulated industries, and large, complex systems.

Unit	Description	Hours
1	**Introduction to DevOps:** Business needs for DevOps, Business values for Devops, How DevOps works. **DevOps Capabalities:** Paths to DevOps Adoption, Plan, Devlop/Test, Deploy, Operate **Adopting DevOps:** Where to Begin, People in DevOps, Process in DevOps, Technology in DevOps	**8**

2	**Using Cloud in DevOps** Cloud as DevOps enabler, Full Stack Deployments, cloud service model for DevOps, Hybrid Cloud **Using DevOps to solve Challenges** Mobile applications, ALM processes, Scaling Agile, Multiple Tier Applications, DevOPs in the enterprise, Supply Chains, IOT.	**8**
3	**DevOps Case Study:** Executive's Role, putting together a team, setting DevOps Goals, Learning from the DevOps transformation, looking at the DevOps results. **DevOps Myths.** **Basics of DevOps tools:** Introduction to Git, Jenkins, Git hub, Docker, Kubernetes.	**10**

Text Books:

1. Real world DevOps Practices by B.Thangaraju Wiley publishers 2024.
2. "DevOps For Dummies" by Sanjeev Sharma & Bernie Coyne. 2nd IBM Limited edition.

Reference Books:

1. " The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology" by Gene Kim, Jez Humble, Patrick Debois, John Willis

2. " the Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win" by Kim, Behr, Spafford

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

SEMESTER IV

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Python Programming (Theory)**		
Course Code:	**BCACACS401**	No. of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the basic concepts of Python Programming.
- Demonstrate proficiency in the handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving file handling.
- Interpret the concepts of Object-Oriented Programming as used in Python.
- Develop the emerging applications of relevant fields using Python.

Unit	Description	Hours
1	**Introduction to Features and Applications of Python**; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program. **Python Basics**: Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples. **Python Control Flow**: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue	**13**

	statements, for loop Statement; range () and exit () functions. **Exception Handling**: Types of Errors; Exceptions; Exception Handling using try, except and finally. Python Functions: Types of Functions; **Function Definition-** Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions	
2	**Strings**: Creating and Storing Strings; Accessing String Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifies; Escape Sequences; Raw and Unicode Strings; Python String Methods. **Lists**: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. **Dictionaries:** Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries. **Tuples and Sets**: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built in Functions on Sets; Set Methods.	**13**
3	**File Handling**: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator. **Object Oriented Programming**: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading. **GU Interface**: The Tkinter Module; Window and Widgets; Layout Management- pack, grid and place	**13**

4	**Python SQLite**: The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables Insert, Select, Update. Delete and Drop Records. **Data Analysis**: NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary 13 and Tuples. Operations on DataFrames. **Data Visualization**: Introduction to Data Visualization; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart	**13**

Text Books:

1. Introduction to python programming by Gowrishankar S. and Veena A., CRC Press.
2. Core python programming by Dr. R. Nageswara Rao, Dreamtech.

Reference Books:

1. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
2. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
3. Advance Core Python Programming, Meenu Kohli, BPB Publications, 2021.
4. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall, 2012.
5. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
6. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Advanced JAVA and J2EE(Theory)**		
Course Code:	**BCACACS404**	No. of Credits	**03**
Contact hours	**52Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes:

After the successful completion of the course, the student will be able to:

- Identify the need for advanced Java concepts like Enumerations and Collections
- Construct client-server applications using Java socket API
- Make use of JDBC to access database through Java Programs
- Adapt servlets to build server side programs
- Demonstrate the use of JavaBeans to develop component-based Java software

Unit	Description	Hours
1	**Enumerations, Autoboxing and Annotations**(metadata): Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying	**13**

	retention policy, Obtaining Annotations at runtime by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations. **Java Beans:** Definition, Advantages of java beans, introspection, bound and constraint properties, persistence, customizers, java beans API,example	
2	**The collections and Framework**: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working with Maps, Comparators. **MVC Architecture in Java**: What is MVC architecture in Java, Advantages of MVC Architecture, Implementation of MVC using Java, MVC Architecture Layers,	**13**
3	**String Handling** :The String Constructors, String Length, Special String Operations, StringLiterals, String Concatenation, String Concatenation with Other Data Types, StringConversion and toString() Character Extraction, charAt(), getChars(), getBytes() toCharArray(), String Comparison, equals() and equalsIgnoreCase(), regionMatches( )startsWith() and endsWith(), equals() Versus == , compareTo() Searching Strings,Modifying a String, substring(), concat(), replace(), trim(), Data Conversion Using valueOf(), Changing the Case of Characters Within a String, **Additional String Methods:-** StringBuffer, StringBuffer Constructors, length() and capacity(), ensureCapacity(),setLength(), charAt() and setCharAt(), getChars(), append(), insert(), reverse(), delete( )and deleteCharAt(), replace(), substring(), Additional StringBuffer Methods, StringBuilder. **RMI Distributed Applications**. How client and server communicate through remote objects. Object Persistence and Serialization, Introduction to Distributed Computing, RMI Architecture, Importance of RMI Registry, Developing Simple RMI application, Callback Implementation in RMI.	**13**

4	**Background; The Life Cycle of a Servlet**; Using Tomcat for Servlet Development; A simpleServlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. **Java Server Pages** (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects **The Concept of JDBC**; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.	**13**

Text Books:

1. Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2. Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.

Reference Books:

1. Y. Daniel Liang: Introduction to JAVA Programming, 7thEdition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.
3. Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Operating System Concepts (Theory)**		
Course Code:	**BCACACS403**	No. of Credits	**05**
Contact hours	**60 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the fundamentals of the operating system.
- Comprehend multithreaded programming, process management, process synchronization, memory management and storage management.
- Compare the performance of Scheduling Algorithms
- Identify the features of I/O and File handling methods.

Unit	Description	Hours
1	**Introduction:** Operating System, Simple Batch Systems, Multi programmed Batched Systems, Time Sharing Systems, Real-Time Systems, Multi-processor Systems. **System Components, Operating System Services.** **File System:** File Concepts- Attributes, Operations and Types of Files; File Structure; File Access methods; Directory Structure; Protection; File System Implementation- File System Structure, Allocation Methods, Free Space Management.	**15**
2	**Memory Management:** Logical and Physical Address Space; Swapping; Contiguous Allocation; Paging; Segmentation; Segmentation with Paging. Virtual Memory: Introduction to **Virtual Memory:** Demand Paging; Page Replacement; Page	

	Replacement Algorithms; Allocation of frames, Thrashing **Disk Scheduling** (I/O Management): Introduction and Scheduling Algorithm	**15**
3	**Process:** Process Concept, Process Scheduling, Operation on Process, Cooperating Process. **Threads** (Thread Concept, Single and Multiple Threads, Benefits **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms: First Come First Serve, Shortest Job, Priority Scheduling, Round-Robin Scheduling, Multilevel Queue and Multilevel Feedback Queue Scheduling, Multiple-Processor Scheduling, Real-Time Scheduling	**15**
4	**Process Synchronization:** Introduction; Race Condition; Critical Section Problem, Semaphores; Classic Problems of Synchronization- Readers and Writers Problem, Dining Philosophers Problem. **Deadlocks:** Deadlock Characterization, Methods of Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.	**15**

Text Book:

1. Abraham Silberschartz and Peter Galvin, Operating System Concepts, 6th edition, TMH

Reference Books:

1. Operating System Concepts - Engineering Handbook, Ghosh PK, 2019.
2. Understanding Operating Systems, McHoes A et al., 7th Edition, Cengage Learning, 2014.
3. Operating Systems - Internals and Design Principles, William Stallings, 9th Edition, Pearson.
4. Operating Systems – A Concept Based Approach, Dhamdhere, 3rd Edition, McGraw Hill Education India.
5. Modern Operating Systems, Andrew S Tanenbaum, 4th Edition, Pearson

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Python Programming - Lab**		
Course Code:	**BCACAPS404**	No. of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Write a program create list with N elements. find all unique elements in the list. If an element is found only once in the list, then add that element to the unique list.
2. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Consider a tuple t1= (1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
    a) Print half the values of tuple in one line and the other half in the next line.
    b) Print another tuple whose values are even numbers in the given tuple.
    c) Concatenate a tuple t2= (11,13,15) with t1.
    d) Return maximum and minimum value from this tuple.

4. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
5. Write a function nearly equal to test whether two strings are nearly equal. two strings a and b are nearly equal if one character change in b results in string a.
6. Write a program to create a text file and compute the number of characters, words and lines in a file
7. Write a Pandas program to join the two given data frames along rows. Sample Data frame may contain details of student like rollno , name , Total Marks.

PART-B

1. Program to create a class Employee with empno, name, depname, designation, age and salary and perform the following function.
   i) Accept details of N employees
   ii) Search given employee using empno
   iii) Display employee details in neat format.

2. Write a program menu driven to create a BankAccount class. class should support the following methods for
   i) Deposit
   ii) Withdraw
   iii) GetBalanace .

   Create a subclass SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest.

3. Create a GUI to input Principal amount, rate of interest and number of years, Calculate Compound interest. When button submit is pressed Compound interest should be displayed in a textbox. When clear button is pressed all contents should be cleared.

4. Write a GUI program to implement Simple Calculator

5. Create a table student table (regno, name and marks in 3 subjects) using MySQL/SQLite and perform the followings

   a. To accept the details of students and store it in database.
   b. To display the details of all the students
   c. Delete particular student record using regno.

6. Create a table employee (empno, name and salary) using MySQL/SQLite and perform the followings

   a. To accept the details of employees and store it in database.
   b. To display the details of a specific employee
   c. To display employee details whose salary lies within a certain range

7. Consider following data and draw the bar graph using matplot library.(Use CSV or Excel).

Batsman	2017	2018	2019	2020
Virat Kohli	2501	1855	2203	1223
Steve Smith	2340	2250	2003	1153
Babar Azam	1750	2147	1896	1008
Rohit Sharma	1463	1985	1854	1638
Kane Williamson	1256	1785	1874	1974
Jos Butler	1125	1853	1769	1436

Display appropriate title for axis and chart. Also show legends.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Advanced JAVA and J2EE -Lab**		
Course Code:	**BCACAPS405**	No.of Credits	**02**
Contact hours	**52 Hours**	Duration of SEA/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

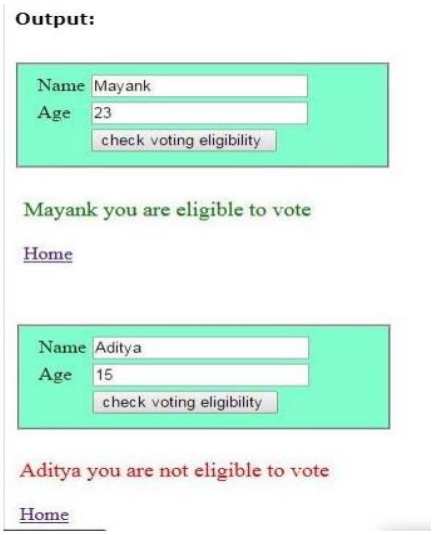
1. Write a program to convert numbers into words using Enumerations with constructors, methods and instance variables.(INPUT RANGE-0 TO 99999)

   EX: 36 THIRTY SIX

2. Find the second maximum and second minimum in a set of numbers using auto boxing and unboxing.
3. Write a menu driven program to create an Arraylist and perform the following operations
   i) Adding elements
   ii) Sorting elements
   iii) Replace an element with another
   iv) Removing an element
   v) Displaying all the elements
   vi) Adding an element between two elements
4. Write a java program to find words with even number of characters in a string, then swap the pair of characters in those words and also toggle the characters in a given string
   EX: Good Morning everyone
   Output: oGdo vereoyen
   gOOD mORNING EVERYONE

5. Write a Servlet program that accepts the age and name and displays if the user is eligible for voting or not

Output:



6. Write a JSP program to print first 10 Fibonacci and 10 prime numbers.
7. Write a java Servlet program to Download a file and display it on the screen(A link has to be provided in HTML, when the link is clicked corresponding file has to be displayed on screen).

PART-B

1. Write a menu driven JDBC program to perform basic operations with Student Table.

MENU

1. **Add new Student**
2. **Delete a specified students Record**
3. **Update Students Address specified students Record**
4. **Search for a particular Student**
5. **Exit**

Student

StRegNo	StName	Stdob	StAddress	StClass	StCourse

2. Write a menu driven JDBC program to perform basic operations with Bank Table.

MENU

1. **Add new Account Holder information.**
2. **Amount Deposit**
3. **Amount Withdrawal (Maintain minimum balance 500 Rs)**
4. **Display all information**
5. **Exit**

Bank

ACC_NO	ACC_NAME	ACC_ADDRESS	BALANCE

3. Write a Java class called Tax with methods for calculating Income Tax. Have this class as a servant and create a server program and register in the rmiregistry. Write a client program to invoke these remote methods of the servant and do the calculations. Accept inputs interactively.

<₹ 3,00,000	No Tax
₹ 3,00,001 to ₹ 6,00,000	5%
₹ 6,00,001 to ₹ 9,00,000	10%
₹ 9,00,001 to ₹ 12,00,000	15%
₹ 12,00,001 to ₹ 15,00,000	20%
>₹ 15,00,000	30%

4. Write a Java class called SimpleInterest with methods for calculating simple interest. Have this class as a servant and create a server program and register in the rmiregistry. Write a client program to invoke these remote methods of the servant and do the calculations. Accept inputs at command prompt.

5. Write a java JSP program to get student information through a HTML and create a JAVA Bean Class, populate Bean and Display the same information through another JSP

6. Write a menu driven program to create a linked list and perform the following operations.
    a. to Insert some Elements at the Specified Position
    b. swap two elements in a linked list
    c. to Iterate a LinkedList in Reverse Order
    d. to Compare Two LinkedList
    e. to Convert a LinkedList to ArrayList

7. Implement a java application based on the MVC design pattern. Input student Rolno, name, marks in three subject calculate result and grade and display the result in neat format.

Percentage of Marks	Grade
Above 90%	A
80% to 90%	B
70% to 80%	C
60% to 70%	D
Below 60%	E

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:5 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:1o Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Distributed Computing (Elective)**		
Course Code:	**BCACAES401**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

At the end of the course the students will be able to:

- Understand concepts behind Distributed Systems.
- Design and build application programs on distributed systems
- Develop, test and debug RPC based client-server programs.

Unit	Description	Hours
1	**Introduction:** Definition, History, Different Forms Of Computing, Strengths and Weakness Interposes Communications An archetypal IPC Program interface, event synchronization, timeouts and threading, deadlocks and timeouts, data representation (Page 78 only), text based protocols, request response protocols, event diagram and sequence diagram.	**8**
2	**Distributed computing paradigms:** Paradigms and abstraction, An example application, paradigms for distributed applications, tradeoffs. The socket API Background, the socket metaphor in IPC, The datagram socket API The stream mode socket API, The socket with non-blocking I/O operations, secure socket API	**8**

3	**Group communication**- unicasting and multicasting, multicast API, connection oriented versus connectionless multicast, reliable multicast versus unreliable multicasting, the java based multicast API, **Distributed objects**-Message passing versus distributed objects, an archetypal distributed object architecture, Distributed object system, remote procedure calls, Remote method invocation.	**10**

Text Book:

1. M.L.Liu, Distributed Computing-Principles and Applications, Pearson Education, 2004.

Reference Books:

1. Mukesh Singhal, Niranjan G.Shivaratri, Advanced Concepts in Operating System, Tata McGraw Hill
2. Willaim Grosso, Java RMI, Shroff/O'reilly, 2002

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Object Oriented Analysis and Design (Elective)**		
Course Code:	**BCACAES402**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

At the end of the course the students will be able to:

- Explain the principles and requirements of OOA and Design
- Describe the object-oriented approach to system development, modeling objects, relationships and interactions.
- Analyze Objects and Classes of the software system.
- Construct object model using object types, attributes, structures and associations.
- Analyze Functional and Dynamic Modeling

Unit	Description	Hours
1	**Introduction** Object orientation concept, OO development concept - Modeling concept, OO methodology, three methods, OO Themes - Abstraction, Encapsulation, combining data & behavior, sharing, Emphasis on the essence of an Object, Synergy **Modeling as a design Technique** Modeling, Abstraction, The three models **Class modeling** Object and class concepts - Objects, Classes, Class diagram, Values & attributes, Operation and methods, Link and Association Concepts - Link and association, Multiplicity, Association and names, Ordering, Bags & Sequences, Association Class, Qualified Association, Generalization and Inheritance- Definition, Use of generalization, Overriding features	**8**

2	**State Modeling** Events - Signal event, change event, Time event, States, Transistors and conditions State Diagrams - Sample State Diagram, one shot state Diagrams, Summary of Basic state diagram notations, State Diagram Behavior - Activity Effects, Do Activities, Entry and Exit Activities, Completion Transition, Sending Signals **Sequence Model**: Scenarios, Sequence Diagram, Communication Diagram, Activity Model - Activities, Branches, Introduction & termination, Concurrent Activities, Executable Activity diagram, Guidelines for Activity models, Deployment Diagram	**8**
3	**Class Design** Overview of Class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms - Choosing Algorithms, Choosing Data structures, Defining Internal classes and Operations, Assigning Operations to Classes, Recursing Downward - Functionality Layers, Mechanism Layers, Refactoring, Design Optimization - Adding Redundant associations for Efficient Access, Saving derived values to avoid Re-computation, Rectification of Behavior, Adjustment of Inheritance - Rearranging Classes and Operations, Abstracting out Common Behavior, Using Delegation to share Behavior	**10**

Text Book:

1. Object Oriented Modeling and Design with UML Michael R. Blaha James R. Rumbaugh, Second Edition, Pearson

Reference Books:

1. UML™ 2 ToolKit – Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY Publishing
2. Object Oriented Analysis and Design with Applications Grady Booch Second Edition (Pearson Education)
3. Object Oriented Software Engineering Bernd Brugge and Allen H. Dutoit Pearson Education

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Digital Image Processing (Elective)**		
Course Code:	**BCACAES403**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

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- Remember the fundamental concepts of Image Processing
- Explain different Image enhancement techniques
- Understand and review image transforms
- Analyze and evaluate digital images.
- Apply digital image techniques in real world scenarios

Unit	Description	Hours
1	**Introduction:** What is Digital image processing, The origin of DIP, Examples of fields that use DIP, Fundamentals steps in DIP, Components of an image processing system. **Digital Image Fundamentals:** Elements of Visual perception, Light and the electromagnetic spectrum, Image sensing and acquisition, Image sampling and Quantization, Some Basic relationship between Pixels	**8**
2	**Image Enhancement in the Spatial Domain:** Background, some basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic / Logic operations, Basics of spatial filtering, Smoothing Spatial Filters, Sharpening spatial filters.	**8**

3.	**Color Image Processing:** Color Fundamentals, Color Models, Pseudocolor Image Processing, Color transformations, Smoothing and Sharpening, Color Segmentation, Noise in Color Images	**10**

Text Books:

1.Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition, PHI/Pearson

Reference Books:

1. B. Chanda, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.
2. Nick Efford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004.
3. Education. Alexander M., Abid K., "OpenCV-Python Tutorials", 2017.
4. Kothari, Ashish M, Digital Image Processing using SCILAB, Springer publication, 2019.

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/ Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**IV**
Course Title	**Basic Web Designing Skills (Compulsory)**		
Course Code:	**BCACASS401**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEA/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Understand the fundamentals of HTML5 and its evolution from previous versions.
- Identify the structure and components of an HTML5 document.
- Utilize HTML5 semantic elements to create well-structured web pages.
- Implement multimedia elements such as audio and video using HTML5.
- Demonstrate the use of HTML5 forms and input types for user data collection.
- Apply best practices for web accessibility and SEO in HTML5 documents.

Unit	Description	Hours
1	**Introduction to Computers and the Internet**-Introduction, The Internet in Industry and Research, HTML5, CSS3, Demos, Evolution of the Internet and World Wide Web, Web Basics. **Introduction to HTML5:** Introduction, Editing HTML5, First HTML5 Example, W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta Elements. **New HTML5 Form input Types**, input and data list Elements and autocomplete Attribute, Page-Structure Elements.	**8**
	Cascading Style Sheets-Introducing CSS, Where You Can Add CSS Rules, CSS Properties-Controlling Fonts, Text	

2	Formatting, Text Pseudo-Classes, Selectors, Lengths, Percentages.	**8**
3	**More Cascading Style Sheets: -**Links, Backgrounds, Lists, Tables, Outlines, The: focus and: active Pseudo-Classes.	**10**

Text Books:

1. Deitel, Paul_Deitel, Harvey_Deitel, Abbey - Internet and World Wide Web How to Program-Pearson Education (US) (2011)
2. Jon Duckett -Beginning Web Programming with HTML, XHTML, and CSS (Wrox Beginning Guides)-Wrox (2004)

Reference Books:

1. The Complete Reference HTML and CSS, 5th Edition, Thomas A Powell, 2017.
2. Animation in HTML, CSS, and JavaScript, Kirupa Chinnathambi, 1st Edition, Create space Independent Pub, 2013
3. Web Programming with HTML5, CSS, and JavaScript-John Dean

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Questions Paper for Pattern Core Subjects

Duration:3 Hours Max.Marks:80

Note: Answer any ten Questions from Part-A. And one full Questions from each unit in Part-B

Part-A

1. 10*2=20

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

Part-B

UNIT-I, II, III, IV

Each unit contain main questions and it carry 15 Marks.
Each main questions contain 2 or more sub question.

4*15=60

UNIT-I

2.

a.
b.
c.

3.

a.
b.
c.

UNIT-II

4.

a.

b.

c.

5.

a.

b.

c.

Questions Paper Pattern for Elective and Compulsory Subjects

Duration:2 Hours Max.Marks:40

Note: Answer any Five from Eight questions from Part-A. And any six Questions out of Nine Questions from Part-B

Part-A

1. 5*2=10

a.
b.
c.
d.
e.
f.
g.
h.

Part-B

Answer any Six questions out of Nine questions.

6*5=30

2.
3.
4.
5.
6.
7.
8.
9.
10.