CHRIST COLLEGE RAJKOT
PROGRAMME OUTCOMES

BSC PHYSICS
PROGRAM OUTCOMES

- Apply the basic laws of physics in the areas of classical mechanics, Newtonian gravitation, relativity, electromagnetism, geometrical and physical optics, quantum mechanics, thermodynamics and statistical mechanics.
- Apply basic mathematical tools commonly used in physics, including elementary probability theory, differential and integral calculus, vector calculus, ordinary differential equations, partial differential equations, and linear algebra.
- Apply more advanced mathematical tools, including Fourier series and transforms, abstract linear algebra, and functions of a complex variable.
- Use classic experimental techniques and modern measurement technology, including analog electronics, computer data acquisition, laboratory test equipment, optics, lasers, and detectors.
- Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner.
- Use basic laboratory data analysis techniques, including distinguishing statistical and systematic errors, propagating errors, and representing data graphically.
- Access information on a topic from a variety of sources, and be able to learn new things on one's own.

PROGRAM SPECIFIC OUTCOMES

LEARNING OUTCOME – PAPER WISE (BSc)

SEM-I: P-101: Mechanics & Semiconductor Electronics

- To learn the basics of vector algebra and calculus and apply the laws to solve the practical problems.
- To identify the basic components of electronic circuits like resistors, capacitors etc and determine their values. To design simple circuits using voltage source or current sources and analyze them.
- To differentiate ordinary P-N junction diode and Zener diode.
- Apply Newton's laws of motion in real life situations.
- Distinguish materials based on elastic properties and modulus of elasticity.

SEM-II: P-201: Wave Optics and Semiconductor Devices

- To study the transverse waves and standing waves in a string and thus study normal modes of a string.
- To understand the mechanism behind the propagation of sound waves in material media.
- To apply semiconductor materials in rectifiers and in transistors.
- To understand the phenomena of interference, diffraction and polarization of light.
- To use the techniques of Fermat's principle for the study geometrical optics.

SEM-III: P-301: Electricity, Magnetism and Semiconductor Electronics

- To apply the basic laws of electricity, magnetism and semiconductor physics in day to day life.
- To differentiate between magnetic and electric forces.
- To understand the working of various electrical and electronic instruments.
- To appreciate the developments in advanced electronic instruments.
- To distinguish between electrical and electronic instruments

SEM-IV: P-401: Thermodynamics & Electronics

- To understand the basic laws of Thermodynamics and apply it in day to day life.
- To apply the basic laws of thermodynamics in understanding nature and natural phenomena.
- To understand the theory and use of Maxwell's equations.
- To apply the basic principles of digital electronics in the construction of various logic gates like AND, OR, NOT etc. and their importance in computers, calculators, mobile phones, etc.
- To study the various digital circuits and devices.

SEM-V: P-501: Mathematical Physics, Classical Mechanics Quantum Mechanics

- To learn the basic concepts of classical mechanics and quantum mechanics.
- To differentiate classical and quantum approaches.
- To apply basic and advance mathematical equations to solve physical problems both in classical mechanics and in quantum mechanics.
- To appreciate the accuracy and beauty of quantum principles.
- To apply the quantum principles in modern instruments.

SEM-V: P-502: Electrodynamics and Relativity

- To understand the motion of a charged particle in an electric and magnetic field.
- To differentiate the effect of electric and magnetic. fields on charges.
- To differentiate the various types of multistage amplifiers.
- To apply the basic principles of electrodynamics in various communication systems.
- To understand the concepts of relativity.

- To apply the principles of relativity relative position of stars, GPS system etc.

SEM-V: P-503: Solid State Electronics

- To study the principles and working of various electronic devices such as multivibrators, clipping and clamping circuits.
- To apply the fundamentals of semiconductor theory in the construction of 4-layer devices such as thyristors.
- To design and fabricate different types of ICs, Op-Amps
- To study the construction and working of various types of transducers.
- To apply the laws of digital logic to design advanced modules, multiplexers/Demultiplexer, flip-flop, logic circuit and IC 555.

SEM-VI: P-601:Nuclear Physics and Particle Physics

- To differentiate between the different types of particle accelerators and radiation detectors.
- To apply the laws of nuclear physics to solve nuclear reactions and understand the importance of nuclear fission and fusion in various fields.
- To apply the basic laws of physics to explain the interactions between the elementary particles, laws governing these interactions and the quark model.
- To compare the micro world comprising atoms and subatomic particles with the vast universe comprising billions of stars.
- To classify subatomic particles based on their charge, mass, spin etc..

SEM-VI: P-602: Statistical Mechanics and Solid State Physics

- To differentiate between Bose-Einstein and Fermi-Dirac statistics.
- To study X-ray diffraction technique and apply the same to determine crystal structure.
- To study the theory of superconductivity and explain the various effects such as Josephson effects, Meissner effect etc.
- To understand the basic principles of photo-conducting and luminescence.
- To apply the principles of photo luminescence in various electronic instruments.

SEM-VI: P-603: Spectroscopy and Applied Optics

- To compare the various spectra and their production
- To understand Raman spectra and its application.
- To understand the basic principles of Laser.
- To compare the different types of Lasers.
- To study the applications of X rays in industry, research and medical fields.
- To compare optical fibre with metal cables.
- To study the applications of fibre optics in communication systems.

LEARNING OUTCOME – PAPER WISE

SEM-I: P-101: Mechanics & Semiconductor Electronics

Unit 1

- To distinguish between scalars and vectors
- To understand the different operations on vectors
- To understand working of different electronic components
- To distinguish between current source and voltage source
- To apply the theory of charging and discharging of a capacitor in RC circuit

Unit-2

- To identify the materials based on energy band gap
- To understand the crystal structure of intrinsic and extrinsic semiconductors
- To distinguish between P-type and N-type semiconductors
- To study the effect of temperature on intrinsic and extrinsic semiconductors
- To identify the different types of diodes and draw their respective I-V characteristics

Unit-3

- To understand Newton's Laws of motion
- To distinguish between Kinetic energy and potential energy, elastic collisions and inelastic collisions
- To distinguish between conservative and non conservative forces
- To understand centre of mass of system of a particles
- To apply Newton's laws of motion in Rocket propulsion

Unit-4

- To distinguish between angular velocity and linear velocity
- To understand the theorems of moment of inertia
- To apply the theorems of moment of inertia to find the moment of inertia of a rectangular bar and a solid cylinder
- To distinguish between gravitational potential, gravitational potential energy and gravitational field.
- To understand Kepler's laws of Planetary motion
- To distinguish between escape velocity and orbital velocity

Unit-5

- To distinguish between stress and strain
- To understand different types of stress and strain
- To determine Young's modulus of a wire by Searle's method

- To study simple harmonic motion and its equation
- To understand the conservation of energy in simple harmonic motion
- To distinguish between damped oscillations, forced oscillation and resonance.

SEM-II: P-201: Wave Optics and Semiconductor Devices

Unit-1

- To understand the concept of wave motion.
- To study the laws of transverse vibration and normal modes in a string
- To estimate the speed of sound in air and other media
- To determine the velocity of sound in air by Newton's formula
- To apply Laplace correction to Newton's formula for the speed of sound
- To understand the theory of Doppler Effect and apply it in various cases such as speeding vehicles, satellites, galaxies etc.

Unit-2

- To use diodes in rectifier
- To understand the different types of rectifiers
- To study the effect of different filter circuits
- To understand the structure of transistors
- To distinguish between transistors and diodes
- To compare different transistor configurations

Unit-3

- To understand the electromagnetic nature of light.
- To distinguish between particle nature and wave nature of light
- To study Huygens' principle and superposition of waves
- To understand Young's double slit experiment
- To compare interference in Lloyd's mirror and Fresnel's biprism.
- To distinguish between interference in thin films and double slit experiment
- To understand Newton's Rings

Unit-4

- To understand the phenomenon of diffraction
- To distinguish between diffraction and refraction
- To compare Fraunhoffer and Fresnel diffractions.

- To compare Fraunhoffer single slit and double slit diffractions
- To understand the construction of zone plate
- To compare a zone plate with a convex lens

Unit-5

- To understand the phenomenon of polarization of light
- To compare the action of a polarizer and analyzer
- To understand Fermat's principle
- To apply Fermat's principle to reflection and refraction of light
- To distinguish between cardinal points and nodal points
- To understand angular dispersion and dispersive power

SEM-III: P-301: Electricity, Magnetism and Semiconductor Electronics

. Unit-1

- To distinguish between scalar and vector products
- To understand transformation of vectors and its significance
- To understand gradient and the usage of Del operator
- To distinguish between divergence and curl and their significance
- To apply product rules for divergence and curl
- To understand the fundamental theorems for divergence and curl
- To compare the fundamental theorems for divergence and curl

Unit-2

- To understand Coulomb's law
- To compare electric and gravitational forces
- To understand continuous charge distribution and field lines
- To understand Gauss law
- To apply the concept of divergence and curl to electric field
- To apply Gauss theorem to different system of charges
- To understand Poisson's and Laplace equations
- To determine the potential due to a system of charges
- To apply electrostatic boundary conditions to various charge distributions

- To determine the energy of continuous charge distribution

Unit 3

- To understand the nature of motion of a charged particle in a magnetic field and crossed electric field and magnetic field
- To distinguish between magnetic Lorentz force and electric Lorentz force
- To apply Bio-Savart's law to determine the magnetic field due to a long straight conductor and circular current carrying coil
- To understand Ampere's law
- To apply Ampere's law to determine the magnetic field due to a long solenoid and toroid
- To distinguish between electrostatics and magnetostatics
- To compare magnetic vector potential and electric scalar potential
- To apply magnetostatic boundary conditions

Unit-4

- To understand the principle, working, construction and advantages of LEDs
- To apply the theory of semiconductor physics in photodiode, solar cell and thermistors
- To understand the working of different types of AC circuits
- To distinguish between LCR series and LCR parallel circuits
- To apply the condition for resonance to a series LCR circuits

Unit -5

- To recall the working and structure of transistor
- To determine operating point, cut off and saturation regions in transistor
- To identify different types of transistors and their biasing
- To construct different electronic circuits using transistors
- To analyze phase reversal, voltage gain, load line, frequency response and bandwidth of a transistor

SEM-IV: P-401: Thermodynamics & Electronics

Unit-1

- To understand thermodynamic system
- To apply thermal equilibrium to a thermodynamic system and define temperature
- To understand the concept of heat, internal energy and specific heat of gas
- To determine the work done during isothermal and adiabatic process
- To understand heat engine, Carnot's ideal engine and Carnot's cycle

Unit-2

- To recall the concept of entropy and disorder
- To determine the change in entropy in adiabatic, reversible and irreversible process
- To apply the concept of entropy to TS diagram
- To understand thermal radiation and black body
- To apply Kirchhoff's law, Stefan's law, Wien's displacement law, Rayleigh Jeans law and Planck's law to black body radiations

Unit-3

- To determine thermodynamic potentials and their relation with thermodynamic variables
- To apply Maxwell relations to Clausius –Clapeyron equation
- To understand specific heat and TdS equations
- To distinguish between Joule-Thomson's effect and Joule-Thomson coefficient

Unit-4

- To understand the constructional details of FET
- To distinguish between FET, JFET, BJT and UJT
- To distinguish between analog and digital signals
- To compare binary system and decimal system
- To distinguish between different logic gates
- To apply De-Morgan's theorem to various logic gates

Unit-5

- To distinguish between A.C bridges and A.C bridges
- To understand the working of L/C Bridge, Owen's bridge, De-Sauty's bridge, Wien's bridge, Schering bridge and Kohlraush's bridge
- To compare the working and advantages of L/C Bridge, Owen's bridge, De-Sauty's bridge, Wien's bridge, Schering bridge and Kohlraush's bridge

SEM-V: P-501: Mathematical Physics, Classical Mechanics & Quantum Mechanics

Unit-1

- To understand Fourier series and its significance
- To determine the various coefficients of Fourier series
- To distinguish between sine and cosine series
- To apply Fourier series to a square wave and a full wave rectifier

- To solve the various Mathematical problems involving Fourier series
- Distinguish between Kronecker delta function and Dirac delta function

Unit-2

- To understand the concept of constraint
- To understand D'Alembert's principle and generalized coordinates
- To understand Lagrange's equation and to obtain the expression for kinetic energy in terms of the generalized coordinates
- To identify the symmetries in conservation laws
- To understand velocity dependent potential of electromagnetic field
- To understand Rayleigh's dissipation function
- Distinguish between Lagrange's and Newton's equations
- To determine different multiples using Lagrangian method

Unit-3

- Understand Hamilton formulation and its applications
- Apply Hamilton's equation of motion to various bodies
- Study the advantages of Hamiltons's approach
- Compare the motion of charged particles in electric and magnetic fields.
- Solve numerical based on Hamilton's equation

Unit-4

- To understand the basic needs of Quantum Mechanics
- To develop Schrodinger equation for a free particle in one dimension and generalize to three dimensions
- To understand the physical interpretation of ψ
- To distinguish between normalizable and non normalizable wave functions
- To apply Schrodinger equation to a particle in a square well potential
- To understand the operators in quantum mechanics
- To compare the quantum equation for force with the classical equation
- To understand the basic postulates of Wave Mechanics

Unit-5

- Study the fundamental postulates of wave mechanics
- Meaning of adjoint of an operator
- Distinguish between adjoint and self adjoint operators
- Understand the concept of degeneracy

- Derive Schrodinger equation for a harmonic oscillator and its solutions.
- Applications of Dirac delta function

SEM-V: P-502: Electrodynamics and Spectroscopy

Unit-1

- Study the various principles of Electrodynamics before Maxwell.
- Understand the properties of dielectrics
- Distinguish between dipoles and monopoles
- Apply Gauss law for dielectrics.
- Definition of susceptibility, permittivity and dielectric constant
- Solve numerical based on polarization
- Distinguish between diamagnetic, paramagnet and ferromagnetic materials based on dielectric constant

Unit-2

- Express Ohm's law in vector form and understand its significance
- Distinguish between E and B fields
- Derive Maxwell's equations
- Understand Poynting's theorem and its applications
- Solve numerical based on Maxwell's equations

Unit-3

- Understand wave equations in one and three dimensions
- Boundary conditions and its applications
- Formulate wave equation in terms of E and B
- Derive equations for energy and momentum for electromagnetic waves.
- Solve numerical related electromagnetic waves

Unit-4

- To distinguish between emission spectra and absorption spectra
- Derive Bohr's equation for hydrogen atom
- Understand Zeeman effect
- Explanation of Zeeman effect based on classical and quantum theories
- Distinguish between Normal and Anomalous Zeeman effect

Unit-5

- Understand molecular spectra and its production
- Distinguish between rotational spectrum, vibrational spectrum and rotational- vibrational spectrum
- Understand electronic spectrum
- Relative importance of the major band spectra
- Numerical based on band spectra

SEM-V: P-503: Solid State Electronics

Unit -1

- Understand the working of Multi-stage Transistor Amplifiers.
- Identify the role of capacitors in transistor amplifiers
- Study the working of RC coupled transistor amplifier
- Comparison of Different types of coupling
- Advantages of transformer coupled amplifier
- Push pull amplifier and its advantages
- Solve numerical on coupled amplifiers.

Unit-2

- Advantages of electronic switches over mechanical switches
- Study the theory of Multivibrators
- Comparison of different types of Multivibrators
- Understand the theory of Differentiating circuit
- Understand theory of Integrating circuit
- Application of Clippers
- Solve numerical on multivibrators.

Unit-3

- Construction of DC power supply
- Use of Zener diode as a voltage regulator
- Understand the importance of series feedback voltage regulation
- Fabrication of integrated circuits
- Difference between amplifiers and operational amplifiers
- Application of operational amplifiers
- Solve numerical on operational amplifiers

Unit-4

- Definition of transducers
- Identify the different types of transducers
- Applications the different types of transducers
- Study the theory of different types of transducers
- Advantages of the different types of transducers
- Solve numerical on transducers

Unit-5

- Distinguish between analogue and digital signals
- Understanding of different types of digital meters
- Construction of different types of digital meters
- Study the theory of half adder and full adder
- Distinction between Multiplexers and Demultiplexer
- Distinction between Decoder and Encoder
- Solve numerical on digital electronics

SEM-VI: P-601: Nuclear and Particle Physics

Unit-1

- Compare the different types of nuclear models
- Deduce conclusions from scattering experiments
- Compare the size of a nucleus with an atom
- Study the theory of liquid drop model
- Study the theory of shell model
- Apply the basic laws of physics to explain the interactions between the elementary particles
- Understand the quark model for elementary particles
- Collect evidences for shell model
- Solve numerical on nuclear models

Unit-2

- Definition of radioactivity
- Understand the processes leading to nuclear disintegration
- Comparison of alpha, beta and gamma rays

- Applications of carbon dating
- Comparison of neutrino with other elementary particles
- Solve numerical on radioactivity

Unit-3

- Understand the interaction of radiation on matter
- Construction of ionization chamber
- Understand the various techniques of artificial transmutation
- Calculation of Q values
- Formulate energy balance equations
- Solve numerical on radioactivity

Unit-4

- Understand the construction of particle accelerators
- To distinguish between linear accelerators and cyclotrons
- Distinction between nuclear fission and fusion
- Calculation of Q values
- Formulate energy balance equations
- Distinguish between nuclear fission and nuclear fusion
- Solve numerical on Q values

Unit-5

- Understand the source of energy radiated by the sun and stars
- To distinguish between atom bombs and nuclear reactors
- Understand the methods of plasma confinement
- Classify elementary particles based on their properties
- Distinction between particles and antiparticles
- Understand Quark model and its significance
- Solve numerical on nuclear reactions.

SEM-VI: P-602: Statistical Mechanics and Solid State Physics

Unit-1

- Understand phase space and volume in phase space
- Distinguish between microstate and macrostate
- Understand Stirling’s approximation

- Derive classical Maxwell Boltzmann distribution law based on classical principles
- Derive Bose-Einstein and Fermi-Dirac Statistics based on the quantum principles
- Differentiate between Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics
- Solve numerical on quantum statistics

Unit-2

- Understand the crystal structure and Bravais lattice
- Identify the different types of crystal structure
- Understand the Debye's theory and Einstein's theory of specific heat of solids
- Compare Debye's theory with Einstein's theory of specific heat of solids
- Understand Dulong and Petit law
- Solve numerical on specific heat

Unit-3

- Apply free electron model to thermionic emission
- Calculation of density of states
- Derive Boltzmann equation
- Application of Boltzmann equation
- Study Bloch theorem and its application
- Solve numerical on free electro model of metals

Unit-4

- Distinguish between conductors, semiconductors and insulators
- Distinguish between extrinsic semiconductors and intrinsic semiconductors
- Understand Fermi level and its significance
- Applications of Fermi equation on thermionic emission
- Distinguish between donors and acceptors
- Solve numerical on free electron model

Unit-5

- Distinguish between conductors superconductors
- Understand the properties of superconductors
- Understand the quantum theory of superconductors
- Understand BCS theory
- Apply the equations of thermodynamics to superconducting transitions

- Solve numerical based on London equation and BCS theory

SEM-VI: P-603: SEM-VI: P-603: Spectroscopy and Applied Optics

Unit-1

- Understand atomic spectra and its origin
- Distinction between emission spectra and absorption spectra
- Distinguish between Normal Zeeman effect and anomalous Zeeman effect
- Understand the theory of Paschen-Back effect
- Distinguish between Paschen-Back effect and Stark effect
- Solve numerical based Lande's splitting factor 'g'

Unit-2

- Understand molecular spectra and its production
- Understand Raman spectra
- Applications of Raman effect
- Understand rotational, vibrational and rotational vibrational Raman spectra
- Solve numerical based on molecular spectra.

Unit-3

- To understand LASER and its production.
- Distinguish between LASER and normal light
- Derive Einstein's coefficient
- Understand the principle of holography and image reconstruction
- Understand the applications of LASER in various fields
- Solve numerical based on LASER

Unit-4

- Understand X-rays and its production.
- Understand the properties of X-rays
- Applications of X-rays in various fields
- Understand X-ray diffraction and its applications in crystallography
- Crystal structure and Brave's lattices
- Solve numerical based on Bragg's X-ray relation

Unit-5

- Understand the basic principle of optical fibre
- Fabrication of optical fibre
- Applications of optical fibre in various fields
- Understand fibre optic communication systems
- Understand the merits of optical fibres over metal cables
- Solve numerical based on critical angle and total internal reflection

BSC CHEMISTRY

No.	Name	Learning Outcomes (SEMESTER-I)
1.1	Atomic structure and periodic properties	Students will know • about the dual nature of electron • along with De-Broglie's equation, Heisenberg's Uncertainty Principle, Quantum numbers, Aufbau Principle • Pauli's Exclusion Principle and Hund's Rule for electron configuration. • get the idea general trends of periodic properties: atomic and ionic radii, ionization potential, electronegativity and electron affinity.
1.2	Chemistry of s and p block elements	Students will learn • Special characteristics such as metallic character, polarizing power, hydration energy, inert pair effect, relative stability of different oxidation state, diagonal relationship of selected elements. • formation of complex compounds, catenation, allotropy (diamond and graphite-their structure, properties and its uses).
1.3	Adsorption	Students will get • knowledge about characteristics and factors affecting types of adsorption (physical and chemical) • an idea about adsorption isotherm and Freundlich equation • to learn Langmuir theory of adsorption
2.1	Chemical bonding in covalent compounds	Students will learn about • Covalent bond, Valence bond theory and its limitations • Concept of hybridization • Stereochemistry of inorganic molecules. • Sidgwick Powell rule and VSEPR theory • Basic concept of MO theory
3.1	Basic Organic Chemistry and aliphatic hydrocarbons containing σ-bond	Students will learn about • basic introduction to organic chemistry including electronic displacements, inductive effect, electromeric effect, mesomeric effect and hyper conjugation • applications of inductive effect • Homolytic and heterolytic fission, curly arrow rules. • Reaction intermediates

		• Types of organic reagents: Nucleophiles and electrophiles. • Types of organic reactions • Stereochemistry in organic chemistry
4.1	Aliphatic Hydrocarbons (acyclic)	Students will learn about • Chemistry of alkanes including formation and reactivity • Mechanism of E1, E2, E1cb reactions, Saytzeff and Hofmann eliminations • Electrophilic addition reaction and its mechanism (Markownikov/ Anti Markownikov rule). • different chemical reactions of alkenes: • Chemistry of alkynes including formation and reactivity
4.2	Catalysis	Students will learn • Introduction, types of catalysis (homogeneous and heterogeneous), characteristics of catalysis, auto-catalysis, negative catalysis (Inhibitor), promoters, and catalytic poisoning. • activation energy and catalysis. • theories of catalysis
5.1	Chemical Kinetics	Students will get knowledge of • basic concept of chemical kinetic including factors affecting rate of the reaction. • Definition, derivation of integrated rate equations for zero, first and second (same and different reactants) order reactions, their characteristics and half -life periods. • Determination of the order of reaction • Theories of Reaction Rates • Calculation of numericals

No.	Name	Learning Outcomes (SEMESTER-II)
1.1	Basics of ionic compounds	Students will learn • Introduction, characteristics of ionic solids • Born Haber cycle and its application • Max Born equation, limiting radius ratio. • Relation between radius ratio, co- ordination number and crystal structure. • Derivation of r+/r- ratio

		• Defects in ionic crystals.
1.2	Basics of co-ordination chemistry	Students will learn • Warner theory, co-ordination number and geometry related to co-ordination number. • Isomerism and its classification. • In structural isomerism: (1) ionization and (2) hydration (3) co-ordination (4) co-ordination positions (5) polymerization and (6) linkage isomerism. Geometric/cis-trans isomerism in ML4and ML6 types of complexes.
2.1	Chemistry of elements of 3d series	• Introduction, definition, electronic configuration, reversal of energies of 3d and 4s orbitals, physical properties such as atomic properties, metallic conductivity, melting point & boiling point, density, reducing properties, tendency of formation of alloys, catalytic properties, magnetic and spectral properties. • Calculation of spin only magnetic momentum of inner orbital and outer orbital complexes
2.2	Solid State	• Forms of solids, unit cells, crystal systems, Bravais lattices. • Laws of crystallography: (1) Law of Symmetry, (2) Law of constancy of interfacial angles and (3) law of rational indices, Miller and Weiss indices. • Bragg's law X–Ray diffraction methods: Rotating crystal method and Powder method. • Structures of NaCl and KCl. Numericals
3.1	Cycloalkanes	Students will learn about • Introduction and classification of ring system. • IUPAC nomenclature • Method of preparation of small ring cycloalkanes • Chemical Properties of Cycloalkanes • Conformations, conformational analysis, conformation of ethane, propane and butane.
4.1	Aromatic Hydrocarbons	Students will learn • Aromaticity • Huckel's rule to simple annulene, cyclic carbocation/anion. • Electrophilic aromatic substitution reactions of benzene with mechanisms, theory of effect of substituents on reactivity and orientation.
5.1	Ionic Equilibrium	Students will get basic knowledge of • types of electrolytes, degree of dissociation and factors affecting degree of dissociation. • Ionic product of water. dissociation constants of weak acids and bases.

		• Common ion effect and calculation of concentrations. • Solubility and solubility products of sparingly soluble salts and its application. • Hydrolysis of salts • Theory of buffer solutions

No.	Name	Learning Outcomes (SEMESTER-III)
1.1	Wave Mechanics	Students will learn • Basic of wave mechanics, including introduction postulates of wave mechanics, interpretation of wave functions. • Derivation of Schrodinger's Equation in three dimensions (Cartesian co-ordinates) • Eigen Function & Eigen Value • Orthogonal & Normalized wave function and problems on it..
2.1	Chemistry of Lanthanide Element	Students will learn various aspects of lanthanide series i.e. • Introduction, occurrence & important ores, isolation of Lanthanide elements from ore. • Electronic configuration with necessary explanation • Oxidation States & their stability • Magnetic Properties, colour (Spectral) properties, • Misch Metal • Uses of Lanthanides & their compounds
2.2	Aryl Halide	Students learn about • Preparation and Mechanism of aryl halide • Other nucleophilic substitution reactions of aryl halides • Benzyne mechanism
3.1	Alcohol, Phenols, Ethers and Epoxides	Students get to learn • IUPAC Nomenclature • Synthesis, Physical and Chemical properties of Alcohols. • Synthesis, Physical and chemical properties of Phenols • Synthesis, Physical and chemical properties of Ethers • Synthesis, Physical and chemical properties of Epoxides

3.2	Nitrogen containing functional groups: Amines	Students learn • Classification, Preparation and Reactions of primary alkyl & arylamines • Nomenclature of di carboxylic • Chemical reactions of aniline • Distinguish between primary, secondary and tertiary amines • Preparation of nitro, nitriles and isonitriles compounds
4.1	Name Reactions and Rearrangements	Students will learn about • Various chemical Reactions and Rearrangements with Mechanism
4.2	Phase Equilibrium	Students will learn • Explanation of Phase equilibrium of one and two component systems • Solid solution-compound formation with congruent melting point (Mg - Zn), • Solid solution-compound formation with incongruent melting point (Na-K),
5.1	Solutions	Students will learn about • Factors, types of solution and types of liquid-liquid solution • Raoult's law and its deviation • Different curves of Ideal and Non-Ideal solution • Lever's Rule, Bubble cap tower, azeotropes and fractional column • Steam distillation and its uses • Factors affecting solubility of gas and effect of pressure
95.2	Nernst Distribution Law	Students will learn about some laws of Physical Chemistry: • Explanation of Raoult's Law, Henry's Law & Nernst Distribution Law • Solute associate, dissociate and chemical reaction with solvent • Applications

No.	Name	Learning Outcomes (SEMESTER-IV)
1.1	Organo Metallic Compounds:	Students will learn various aspects of organo metallics i.e. • Classification based on nature of M - C Bond • Preparation, Properties and uses of Organo Lithium • Preparation of Organo Beryllium, Organo Aluminum and Zeise Salts • Structure of Tri Methyl aluminum (Dimer), Zeise Salt [PtCl2 – C2H4] and Ferrocene

1.2	Bio Inorganic Chemistry	Students will learn various aspects of Bio Inorganic Chemistry • Structure and roll of Hemoglobin • Structure of Chlorophyll • Toxicity of Ar, Hg, Pb and Cd
2.1	Chemistry of Rare Gas Compounds	Students get to learn about • Occurrence and compounds of Inert Gas • Preparation, Structure and properties of Noble gases
2.2	Active Methylene Compounds	Students learn some properties of active methylene compounds i.e. • Preparation and Keto-enol Tautomerism in Ethyl acetoacetate • Proof for Structure of Ethyl acetoacetate • Physical and chemical properties of Ethyl acetoacetate • Some compounds synthesized from Ethyl acetoacetate
3.1	Carbonyl Compounds Chemistry of Carbonyl Compounds (Aldehydes & Ketones)	Students will be able to know about • IUPAC Nomenclature of Aldehydes and Ketones • Synthesis, Physical and Chemical properties of Aldehydes. • Synthesis, Physical and chemical properties of Ketones
3.2	Carboxylic acid and its derivatives	Students will learn • Nomenclature, synthesis, Physical and Chemical properties of mono carboxylic acids • Nomenclature of di carboxylic • Reactions of acid derivatives • Mechanism of Esterification • Hydrolysis of Esters ($B_{AC}2$ Mechanism) • Trans-esterification
4.1	Name Reactions and Rearrangement-II	Students get to know about • Various chemical Reactions and Rearrangements with Mechanism
4.2	Physical Properties and Molecular Structure	Students learn about physical properties such as • Introduction • Surface Tension, Parachor, Viscosity, Refractive Index and its method for determination • Theory of Optical activity, dipole moment and its method for determination • Application and numerical

5.1	Thermodynamics	Students will learn • Limitation and advantages of Thermodynamics • Types of system, processes and properties • Statements and derivation of First Law, Heat Capacity, Joule Thomson Effect and Zeroth Law

Paper C- 501: Inorganic Chemistry and Industrial Chemistry

No.	Name	Learning Outcomes
1.1	Multi Electron System	Students will learn • Concept of spectral terms and term symbols. • s-s coupling, l-l coupling, l-s coupling, j-j coupling and L-S coupling with vector diagram. • Derivation of spectral term symbol for P1,P2,P3,&d1 to d9. • Micro states: definition, calculation and derivation of microstates for p1,p2,d1&d2 (pigeon hole diagram). • Hund's rules for the determination of ground state spectral term.
2.1	Crystal Field Theory-1	Students will learn • Concept of crystal field theory • Splitting of d-orbitals in octahedral and tetrahedral crystal field with CFSE concept. • Factors affecting splitting energy i.e. Weak field and strong field ligands, high spin and low spin complexes with pairing energy. • Magnetic behaviour of transition metal complexes. • Orbital angular momentum contribution to magnetic momentum of complexes. • Examples based on CFSE, Pairing energy and magnetic momentum. • Jahn-Teller effect: Statement and explanation. • Tetragonal distortion with example. • Splitting of d-orbitals in square planar complexes with examples. • Hole formalism. • Splitting of D and F ground terms (using hole formalism). • Orgel Diagram of D and F states.

3.1	Basics of Electronic spectra of Transition Metal Complexes	Students get to learn • Introduction to the concept • Selection rules for d-d transition • Relaxation in selection rules • Characteristics of Absorption Spectrum • Types of electronic transition in metal complexes • Discussion of Absorption spectrum of Ti^{+3}, Cu^{+2} & Ni^{+}
3.2	Cement	Students get to learn about cement as: • Type and raw material for manufacture • Cement rock benefication • Manufacturing Processes, properties and uses and testing • Indian Standard Institute (ISI) specification of cement
4.1	Fertilizers	Students learn about fertilizers like: • Classification, properties manufacturing and uses of mainly nitrogen fertilisers like ammonium nitrate, ammonium sulphate, urea. • Similarly for Phosphate fertilizer like, normal super phosphate, triple super phosphate, ammonium phosphate.
5.1	Glass	Students get to learn about glass: • Physical and chemical properties of glass • Raw materials for manufacture • Chemical reactions involved • Method of manufacturing • Special types of glasses

Paper C- 502: Organic Chemistry and Structural Chemistry

No.	Name	Learning Outcomes
1.1	Name Reactions, Rearrangement and Reagents:	Students will know • the reaction mechanism and application of: Arndt Eistert Reaction, Bischler Napierski Reaction, Leuckart Wallach Reaction

		• the reaction mechanism and application of : Hoffmann Rearrangement, Curtius Rearrangement, Fries Rearrangement • the synthesis and uses of reagents: Lithium Aluminium Hydride $LiAlH_4$, Triphenyl phosphine & Sodamide
1.2	Alkaloids	Students will • be able to define alkaloids • know the source of alkaloids and the methods of isolation • know the chemical reactions involved in determining the structure of alkaloid • know the constitution and chemical reactions for the synthesis of Coniine, Nicotine & Papaverine
2.1	Carbohydrates	Students will: • Be able to define carbohydrates • Be able to classify carbohydrates • Be able to write the chemical equations for the chemical reactions of monosaccharides • Know the structure and chemical properties of glucose and fructose • Be able to write the chemical equations for the chemical reactions for the inter-conversion of monosaccharides • Know the methods to determine ring size of monosaccharides • Be able to define the terms: mutarotation and epimerisation
2.2	Polynuclear Aromatic Hydrocarbons	Students will: • Be able to define classify polynuclear hydrocarbon • Be able to learn synthesis of various polynuclear hydrocarbon • Be able to learn chemical properties of polynuclear hydrocarbon.
3.1	Synthetic Drugs, Dyes and Sweetening Agents	Students will • Be able to define drugs, dyes and sweetening agents • Will be able to write the chemical equations for the synthesis of Drugs: Ibuprofen, Atenlol and Adrenaline Dyes: Orange II, Crysodine G, Auramine O Sweetening Agents: Saccharin, p-anisylurea and aspartame • Will know the uses of the above-mentioned drugs, dyes and sweetening agents
3.2	Conformational Isomerism	Students will • Know the types of isomerism

		• Understand the conformational analysis of butane and cyclohexane • Understand and draw the various conformers of cyclohexane and monosubstituted cyclohexane • Calculate the energy of each conformer
3.3	Ultraviolet-Visible Spectroscopy	The students will • know the principle of UV-VIS spectroscopy • know the working of UV spectrophotometer • know the causes and types of electronic transitions • be able to explain the cause for shifting of spectral bands • be able to calculate λ_{max} of compounds • know the applications of UV –VIS spectroscopy
4.1	Molecular Symmetry	Students will • Be able to define elements of symmetry and symmetry operations • Be able to determine the symmetry elements present in a molecule • Be able to define symmetry point group • Know the different symmetry point groups • Be able to classify the molecules into different point groups • Be able to write the multiplication table for C_{2v}, C_{3v} and C_{2h} point groups.
5.1	Infrared Spectroscopy	Students will be able to: • understand the basic principles of IR spectroscopy • know the working of IR spectrophotometer • identify and explain factors that influence the strength and frequency of an IR peak. • assign key peaks in an IR spectrum. • determine which peaks are most diagnostic in making an assignment of structure using IR. • deduce unknown structures and fully assign an IR spectrum to the structure.

Paper C- 503: Physical Chemistry and Analytical Chemistry

No.	Name	Learning Outcomes
1.1	Second Law of Thermodynamics	Students will learn • Limitation of first law of thermodynamics • Spontaneous process

		• Carnot cycle and theorem • Statements of second law of thermodynamics • Perpetual motion of second kind • Concept of entropy, Definition of entropy • ΔS in reversible and irreversible (spontaneous) process, ideal gases, mixture of ideal gas, physical transformations • Entropy and second law of thermodynamics • Physical significance of entropy
2.1	Electrochemistry-1	Students get to learn • Introduction to concentration cells. • Concentration cells without transference, • Concentration cells with transference, • Liquid junction potential, Elimination of liquid junction potential. • Applications of emf measurements:
2.2	Phase Rule	Students get to learn • Three component system, • Method of graphical presentation, • Types of partially miscible three liquid systems: • Application of ternary liquid diagram
3.1	Free Energy and Chemical Equilibrium	Students will learn • Work function, free energy: its physical significance and variation with P, V and T • ΔG for ideal gases, Derivation of Gibbs Helmholtz equation and its applications • Criteria for chemical equilibrium • Derivation of Vant Hoff reaction isotherm • Vant Hoff isochore • Law of active mass • Clausius Clapeyron equation
3.2	Colorimetry	Students learn about: • Growth Drapper law, Lambert's Law, Beayer's Law. • Spectro photometric titration with graph and proper explanation

		• Deficit of absorbance by product and Titrant, Deficit of absorbance by product and Reagent, Deficit of absorbance by Reagent and Titrant, Deficit of absorbance by product only.
4.1	Conductometry	Students learn about: • Electric Transport, Specific conductance in metals and electrolyte solution, equivalent conductance • Importance of conductivity electrodes and platinization of electrodes. • Variation of specific conductance • Kohlrausch law and its importance, cell constant and importance • Conduct metric titration Strong acid – Strong base, Strong acid - Weak base, Weak acid – Strong base, Mixture of Strong acid + Weak acid – Strong base. • Precipitation Titration : $AgNO_3$ – NaCl $BaCl_2$ – K_2SO_4 $Ba(OH)_2$ – $MgSO_4$ • Replacement Titratin : Salt of Weak acid – Strong acid Salt of Weak base – Strong base • Degree of hydrolysis and Hydrolysis constant • Solubility and Solubility product of sparingly soluble salt • Important of conductivity water and temperature for the measurement of conductivity.
4.2	Introduction of complexometry Titration	Students learn about: • Method of preparation of standard E.D.T.A. Solution, • Velcher's law explanation of pm → EDTA vol., Graph with stability constant value. • Types of EDTA Titration • Pprinciple of metal ion indicator.
5.1	Volumetric analysis with example of calculation based on pH, normality, molarity, Ksp etc.	Students learn about: • Explanation of neutralization titration with graph. • Strong acid – Strong base titration • Weak acid – Strong base titration • Strong acid – Weak base titration • Poly protic acid – strong base titration

		• Redox titration with graph and calculation • Iodometry and Iodimetry titration • Preparation of standard sodium thiosulphate solution • Principle of external and internal indicator in redox titration. • Precipitation Titration • Mohr's method • Fazan's method • Volhard's method • Examples and calculation of pH, Normality, Molarity, Ksp etc…..

Paper C- 601: Inorganic Chemistry and Industrial Chemistry

No.	Name	Learning Outcomes
1.1	Wave Mechanics	Students will learn • Operators algebra • Particle in one dimensional and three-dimensional box • Wave equation for hydrogen atom to derive the relation between Cartesian and polar coordinates, derivation of volume element in polar coordinates, Schrodinger equation in polar coordinates, separation of variables. • Energy of 1s orbital, normalization condition and problems on it in polar coordinates.
2.1	Magneto Chemistry	Students get to learn • Magnetic induction. • Permeability, intensity of magnetism, magnetic susceptibility, molar magnetic susceptibility. • Magnetic behaviour : Diamagnetism, Paramagnetism, Ferro magnetism and Antiferro magnetism. • Effect of temperature on magnetic behaviour of substances. • Derivation of equation for total angular magnetic momentum and diamagnetic momentum.
3.1	Transition metal complexes of π - acid ligands	Students get to learn • Metal carbonyls: Definition, preparation, physical and chemical properties, nature of M-CO linear bond based on M.O. Theory with spectral support, classification of metal carbonyls, types of CO groups and detection of CO groups using IR spectra. • Structure of some metal carbonyls • Metal nitrosyls.

3.2	Oil and Fats	Students learn about oil and fats including: • Distinction between oils and fats • Properties of fats and oils • Classification of fats and oils • Manufacturing of cotton seed oil • Refining of crude vegetable oil • Analysis of oils and fats
4.1	Environmental Chemistry	Students learn about: • Segments of environment • Types of Air pollution • Water pollution • Sources of water pollution • Water Pollution Control • Dissolved Oxygen (D.O.) determination • Chemical Oxygen Demand (C.O.D.) determination • Biological Oxygen Demand (B.O.D.) determination
5.1	Soaps and Detergents	Students learn about: • Raw materials for manufacture • Methods for manufacture of soap • Types of soap • Recovery of glycerin from spent lye. • Principal group of synthetic detergents • Biodegrability of surfactants • Classification of surface-active agents • Manufacture of detergents

Paper C- 602: Organic Chemistry and Structural Chemistry

No.	Name	Learning Outcomes
1.1	Synthesis of Heterocyclic Compounds containing two hetero atoms	The students will • Be able to define heterocyclic compounds

		• Know the various types of heterocyclic compounds • Be able to write the chemical equation for the synthesis of: Pyrazole, Imidazole, Isoxazole, Thiazole, Pyrimidine, Pyridazine, Oxazine, Thiazine, Dioxane
2.1	Synthetic Explosive, Perfumes and Insecticides	Students will • Be able to define explosives • know the synthesis of Explosives: RDX, TNT, PETN • know the components of perfumes • know the synthesis and uses of perfumes; Musk Xylene, Musk Ketone and Musk Ambrette • know the synthesis and uses of insecticides: Baygon, Carbendazim and Parathion
2.2	Amino acids, Peptides and Proteins	Students will: • Be able to classify amino acids • know the names and write the structures on amino acids • know names of essential and non-essential amino acids • be able to write the chemical equations for the synthesis of amino acids • understand the physical and chemical properties of amino acids • be able to define isoelectric point • be able to define polypeptides • understand – protecting grous • be able to write the chemical reactions for the synthesis of polypeptides • be able to classify proteins • be able to write the structure, reactions for the constitution and synthesis of thyroxin • will understand the importance of thyroxin
3.1	Terpenoids	Students will • be able to define terpenoids • know the source of terpenoids and the methods of isolation • be able to classify terpenoids • know the isoprene rule • know the chemical reactions involved in determining the structure of terpenoids • know the constitution of Citral & α-Terpineol • be able to write the chemical equation for the synthesis of Citral & α-Terpineol

3.2	Mass Spectrometry	Students will be able to: • understand the fundamental theory of Mass spectrometry • know the working of Mass Spectrometer • Understand the modes of fragmentation • recognize the various types of fragment patterns • Explain the important features of mass spectra o f alkanes
4.1	NMR Spectroscopy	Students will be able to: • understand the fundamental theory of NMR spectroscopy • know the working of NMR spectrophotometer • understand the concepts of equivalent and non-equivalent hydrogens. • understand the effect of structure on chemical shift and coupling constants. • demonstrate awareness of the regions of the NMR spectrum where various key protons are found. • demonstrate how to utilize integrals for structure analysis • deduce unknown structures and fully assign an NMR spectrum to the structure.
5.1	Problems based on UV, IR, NMR spectroscopy	Students will be able to: • be able to deduce hydrogen deficiency index (HDI) from a molecular formula and use this in structure determination. • deduce organic structures using spectroscopic methods: especially infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy. • determine molecular formula from structures, molecular mass and other sources of information

Paper C- 603: Physical Chemistry and Analytical Chemistry

No.	Name	Learning Outcomes
1.1	Activity of Electrolytes Ionic Activity	Students get to learn • Introduction • Derivation of $a_2 = a_+^{\nu+} a_-^{\nu-}$ and $a_2 = a_+ a_-$ for 1-1 electrolyte • Mean Activity and relationship between $a_\pm$, its relation with a_+ and a_- • Mean ionic activity coefficient $f_\pm$ and f_+, f_- • Ionic Strength & Debye Huckel Limiting Law
1.2	Third Law of Thermodynamics	Students will learn • Nernst heat theorm

		• Determination of absolute entropies of solids, liquids and gases • Applications of third law of thermodynamics • Tests of third law of thermodynamics, Residual entropy • ΔS in reversible and irreversible (spontaneous) process, ideal gases, mixture of ideal gas, physical transformations.
2.1	Electrochemistry-2	Students get to learn • Introduction to concentration cells. • Concentration cells without transference, • Concentration cells with transference, • Liquid junction potential, Elimination of liquid junction potential. • Applications of emf measurements:
3.1	Partial Molar Properties (6 hours)	Students will learn • Concept of chemical potential, Gibbs-Duhem equation • Variation of chemical potential with temperature and pressure • Determination of partial molar properties by method of intercept • Applications of chemical potential (Henry's law, Rault's law and Nernst's distribution law)
3.2	Errors and statistics	Students get to learn about: • Explanation of errors and mistake • Classification of errors • Accuracy and precision, minimization of error • Calibration of Instruments • Explanation of Significant figure and its laws with complete interpretation • Mean and standard deviation, variance and coefficient of variance • Importance of Q – test and T -test
4.1	Chromatography	Students learn about: • Introduction to chromatography. • Classification and in-depth study of chromatographic techniques including column, partition, gas & Ion exchange. • Application such as main physical characteristic of chromatography: Solubility, adsorption value, volatility, Rf value, Rx value, nature of adsorption etc.

5.1	Basic Principle of Qualitative analysis only separation	Students learn about separation of following radicals in presence of each other: (1) Cl^{-}, Br^{-} , I^{-} (2) NO^{-}_{2} , NO^{-}_{3} , Br^{-} (3) S^{-2} , SO_3^{-2} , SO_4^{-2} (4) PO_4^{-3} , As O_3^{-3}, AsO_4^{-3} (5) CO_3^{-2} , SO_3^{-2} , S^{-2} (6) Cu^{+2} , Cd^{+2}

BSC BOTANY

No.	Programme:	PO / PSO
1.	B.SC	• To provide students with an organized approach of living systems and their functions and applications with respect to below mentioned points. • Identify, recognize, ecology, habit and distribution of plants in the biosphere. • Identify and define variety of terms specific to the plant biology (Taxonomy, Anatomy, physiology, genetics growth and development). • Understand and describe the structure morphology & anatomy, composition & properties of plants systems, physiology, genetics & behaviours of plant system. • Predict an outcome using several pieces of information; and apply the information in scientific manner pertaining to provide solution towards plant growth development and pathological problems.

Semester – 1	Unit	outcomes
B – 101: Plant Diversity	1: Introductory Botany and Algae	Botany is a natural science concerned with the study of plants. Able to understand different branches of Botany such as systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics and molecular biology of various life-forms..
		Use of Modern techniques to study plants and Current trends in plant sciences
		Understand the diversity among Algae.
		Know the systematic, morphology and structure, of Algae
	2: Fungi	Learn the structure, functions, anatomy and life cycle of fungi
		learn about the impact of fungi on human health, nutrition and drug discovery. T
		Apply information about fungi to everyday life
	3: Bryophyte	Know about the structure, life history and Economic importance of bryophyte
		Learn about classification, characteristics, ultra structure ofbryophyte
	4: Pteridophyte	Gain the knowledge on general characteristics, classification, histological study and economic importance of Pteridophyte
	– 5: Gymnosperm	Study and impart knowledge about the occurrence, distribution, structure and life history ofGymnosperm

		Know about the impact of plants on environment and understand the need of conserving the plants

Semester – 2	Unit	outcomes
B-201: Angiosperms, Biochemistry, Genetics and Techniques	1: Vegetative Morphology	Able to know about the plant that any portion of a plant that is involved in growth, development, photosynthesis, support, etc., and not involved in sexual reproduction
		Study the morphological structures of vegetative part: leaf, stem and root.
	2: Reproductive Morphology	able to identify the *reproductive* parts of a flower like Calyx, corolla,Androecium and Gynoecium
		Learn to describe the structure of flowers by drawing floral formula and diagram
		Role of flowers in formation of seeds and fruits
		Describe the different type of inflorescence formed by the plants
	3: Systematic Botany	Understand Taxonomy which is a branch of science of classifying and naming organisms in a hierarchical system, and phylogeny.
		Also understand an expression of the evolutionary history and relationships of organisms and plants represented as phylogenetic trees
		Learn the types of classifications- artificial, Natural and phylogenetic.
		Identify characteristics of undiscovered species and arrange them in respective 'taxa' after looking at their similarities and to give them scientific names.
	4: Tools and Techniques in Botany	To learn the Plant tissue culture techniques, preparation of culture medium and also the role of tissue culture in crop improvement.
		Measurement of pH of a solution.
		Gain skill on working principles of spectrophotometer
		Learn the technique of Chromatography
	5: Biochemistry and Genetics	Learn the properties, Enzyme structure and Mechanism of enzyme action
		Gain the knowledge about Mendelian principles, DNA structure, replication and protein synthesis

Semester – 3	Unit	Outcomes
B 301 PLANT DIVERSITY – 2	1. Algae	Basic understanding of Eukaryotic algal cell.
		To differentiate and recognize thallus ranges of algae.
		To learn Life history of the genus *Nostoc* and *Batrachospermum*
		Awareness will be created about Algae causing biological disturbances.
	2. Fungi	To develop ability of learning cell organelles of fungal cell.
		Get acquainted with • Life history • Industrial applications of *Aspergillus, Saccharomyces*
	3.Bryophyta	Students will acknowledge with Vegetative reproduction in Bryophytes.
		They will go through the Life history of *Marchantia* and*Funaria*
		Economic importance of Bryophytes.
	4.Pteridophyta	Students recognize the Life histories of *Sellaginella Adiantum*
		Basic knowledge of evolutionary track of tracheophytes.
		Students will learn stellar evolution.
		Students will be enlightened with the fact that how leaves and sporangia came in to existence
	5.Gymnosperm and angiosperms	Evolution of seeded plants by understanding • Embryogeny • Life history of *Pinus*.
		A practical approach will be created by field Study of different plants families of dicot and monocot plants

Semester – 4	Unit	outcomes
B- 401 Study of Plants with reference to Anatomy, Embryology, Physiology, Ecology and Application	1. Plant anatomy	Students will learn about anatomical structures of plant parts
		To create curiousness about meristematic growth by observing practically as well as theoretically
		Students can compare normal and Anomalous secondary growth in plants
	2. Plant embryology	To understand Megasporogenesis in plants
		To distinguish different types of embryo sac
		Get acquainted with Development of malegametophytes
		To realize the differences between single and double Fertilization
	3. Plant physiology	They will be acknowledged with similarities of human and plant physiology
		To learn about how organic solutes are translocated in plants.
		Developing a practical approach by connecting diffusion, imbibition with routine life
		Correlation of routine life with scientific study of vernalization
		Developing of scientific approach about reasons of seed dormancy.
	4. Ecology	They can demonstrate significant value-added progress in developing the values like Appreciation of the aesthetic attributes of nature, whether their studies are primarily in the field where entire ecosystems or biomes are investigated
		To gain deep knowledge about soil erosion
		Students will correlate different government policy for conservation of soil.
		Demonstration of remote sensing by routine life examples
	5. Applied botany	Awareness is created about recent techniques like - Artificial Seeds
		To learn usefulness of Herbarium preparation
		Students will understand how Polyploidy occurs in plants
		Basic knowledge of hybridization technique
		To recognize about Maternal Influence on inheritanc

Semester – 5	Unit	Outcomes
B-501 Cryptogamic Botany and Plant Pathology	1.Algae	Know about the structure, life history and Economic importance of different algal species
	2.Fungi	Lean about the structure, life history and Economic importance of different fungal species
	3.Bryphytes	Study the life history and occurrence of bryophytes
	4.Pteridophytes	Lean about the morphology, Anatomy and life history of Pteridophytes
	5.Plant Pathology	Aware with some common plant diseases in India
		Know about pathogens responsible for plant diseases & methods of studying plant diseases
B- 502 Biology of Seed Plants	1.Gymnosperms	Lean about the morphology, Anatomy and life history of Gymnosperms
	2.Angiosperms	Learn the types of classifications- artificial, Natural and phylogenetic
		Know about origin of Angiosperms
		Familiarize with concept of taxon, taxonomy, genus and species
	3.&4. Taxonomic studies of Plant families	Brief studied the Plant familieswith special respect to their Botanical name, morphology of useful part and the uses
	5.Embryology	Understand the basic knowledge about development of embryo, endosperms and their functions
		Learn the structure and development of pollen grains
B-503 Ecology	1.Ecology and Autecology	Learn the Approaches to the study of Ecology (Autecology
		Understand the effect of ecological factors, biological clock
		Know about the Principles of Liebig's Law and Shelford's Law of tolerance
	2.Communities structure and Classification	Learn the basic concept of Community, its structure and methods of ecological studies
	3.Ecological Succession, Population	Gain knowledge on Plant Succession, characteristics of population and Ecological niche
	4.Ecosystem	Get aware of structure and types of Ecosystem
		Also know how to flow energy in ecosystem and its productivity
	5.Ecological management	Know about the environmental Law and GPS

Semester – 6	Unit	Outcomes
B-601 Cytology, Genetics, Molecular Biology, Biotechnology and Anatomy	1.Cytology	Learn the structure, organization and functions of cellular organelles
	2. Genetics	Learn about Linkage, Crossing over and gene mutations
		Know about cytoplasmic inheritance& Extra chromosomal inheritance
	3. Molecular Biology	Learn about structure of tRNA restriction ,endonucleasesand cloning vectors
		Know the principles of techniques used in recombinant DNA technology
	4.Biotechnology	Learn about the applications of Biotechnology in making of Transgenic plants
		Techniques for germplasm storage like Cryopreservation
		Understand the basic knowledge about tissue culture tools, medium, sterilization and techniques of tissue culture.
	5.Anatomy	Study the internal structure of Plants
		Study the anomalous secondary growth in particular plants like Salvadora, Bougainvillea etc.
		Learn histological techniques- fixation, dehydration, embedding, hand sectioning, microtome sectioning
B-602 Plant Physiology, Biochemistry, Biostatistics, Microbiology and Biodiversity	1. Plant Physiology	Know about the requirement of plant growth regulators for plant development
		Understand the process of Photosynthesis, Respiration
	2. Biochemistry	Know the structure, classification and properties of Carbohydrates, Proteins and Lipids
	3. Biostatistics	Studied various statistical methods of analysis
	4. Microbiology	Know the ultra-structure of micro-organism and their industrial applications
	5. Biodiversity	Scientific study of plant diversity with respect to their concept, Measurement and conservation
B-603 Instrumentation, Advance techniques in Biology, Forest-Forestry, Medicinal	1. Instrumentation	Gain skill on working principles of Lamina air flow, Autoclave, Incubator, oven and centrifuge
	2. Advance techniques in Biology	Learn the technique of Electrophoresis, PCR and Chromatography
	3. Forest-Forestry	Get aware of different types of forest occur in India
		Forest component: Social and Agricultural Forestry
		Consider the value of Wild life sanctuary and Biosphere reserve

Plants and Economic Botany, Horticulture and Plant Breeding	4. Medicinal Plants and Economic Botany	Brief studied onmedicinal properties of medicinal plants with their Botanical name, family, economic important plant parts.
		Use of plant products with respect to human welfare
	5.Horticulture and Plant Breeding	Learn the techniques of gardening - Types, Methods & Tools
		Learn cultivation of commercial flower crops
		Gain knowledge on Plant breeding techniques like Pedigree method & Bulk method

BSc (Biotechnology)

Semester	Paper	Unit	Learning Outcomes
Semester-1	INTRODUCTION TO BIOTECHNOLOGY AND CELL BIOLOGY BT-101	Introduction and Scope Of Biotechnology	➢ To uncover the fundamental principles, developments and potential applications of Biotechnology ➢ Understand the concept and applications of Biotechnology. ➢ Demonstrate basic laboratory skills necessary for Biotechnology research. ➢ Explain the principles that form the basis for recombinant DNA technology. ➢ To know the ethical and social impacts of Biotechnology.
		Basic concept and understanding of cell	➢ To study concept of cell, origin and evolution of cell, different cell theories ➢ To understand the cell Structure with focus on chemical composition and structural organization of plant, animal and prokaryotic cell ➢ To decipher Ultrastructure and Function of Prokaryotic cell and Virus ➢ To study in detail about principal, instrumentation and applications of Microscope
		Structure and function of cell organelles	➢ To understand the ultrastructure and function of power house of the cell – Mitochondria ➢ To understand the importance of cell membrane and cell wall ➢ To understand the structure and function of GERL system ➢ To know structure and function of microbodies
		Nucleus, cell cycle and cell division	➢ To unravel the components and function of nucleus ➢ To decipher the ultrastructure of chromosome and its functions in improving understanding about how genes works at genetic level ➢ To improve understanding about cell cycle and how it is regulated and operated ➢ To envisage about cell division and difference between mitosis and meiosis
		Advance studies in cell biology	➢ To understand structure and function of cytoskeleton in cell support and movement ➢ To know types of cell locomotion and importance in the process of cell movement ➢ To understand the concept of stem cell, types, applications of stem therapy ➢ It provides insights and understanding about cancer, types of cancer and different types of cancer

Semester-2	FUNDAMENTALS OF BIOMOLECULES BT-201	Chemistry of Life: An Introduction	➢ To understand properties of universal solvent 'water' and overview other biomolecules ➢ To decipher the types of covalent and non-covalent bonds (Ionic, Nonpolar, Polar, Hydrogen Bonds, Hydrophobic Interactions, Vander Wall's Attractive Force) and importance in stabilization of molecules ➢ To understand the concept of pH and Buffers ➢ To understand the importance of laws of thermodynamics, key words associated with thermodynamics like entropy, free energy, ATP and other energy rich molecules.
		The Molecules of Life – I: Carbohydrates	➢ It would help students to understand basic chemistry and types of carbohydrate provided to us by nature ➢ To know the basic knowledge of types of isomers exhibited by carbohydrate (epimers, anomers, stereoisomers), also difference between conformation and configuration. ➢ To know reactive sites, present in these molecules which help molecule to participate in different reactions ➢ To understand classification, and function of disaccharides and polysaccharides ➢ To understand the concept and types of Glycoconjugates
		The Molecules of Life – II: Proteins	➢ To understand the fundamentals of Amino Acids with focus on structures, general properties, classifications, Nomenclature, Non-standard Amino Acid (Amino Acid Derivatives) ➢ To understand fundamentals of Proteins with references to Four Levels of Structures in Proteins, ➢ To know the properties and classifications of proteins, importance of biologically important Peptides ➢ To explore protein folding and DNA-protein and Protein-Protein Interactions ➢ To deduce Protein sequencing by different methods
		The Molecules of Life – III: Nucleic acids	➢ To develop Basic Understanding of building blocks of Nucleic acids ➢ To study important Historical aspects of Nucleic Acids including Semi Conservative mode of DNA and Chargaff's Rule ➢ To study in detail about Watson and Crick DNA Double Helix Structure, Types of DNA Structure,

			➢ To understand RNA, types and their Functions, and concept of Catalytic RNAs (Ribozymes) ➢ To deduce Nucleic acid sequencing by methods
		The Molecules of Life – IV: Lipids and vitamins	➢ To study classification and Function of Lipids: ➢ To understand structure and of Fatty Acids, Triacylglycerol's, Phospholipids and Steroids in detail. ➢ To study vitamins in detail with perspective of classification, functions and Sources ➢ Detailed study would help to understand the deficiency disorders associated with Vitamins and explore sources associated to improve the deficiency
Semester-3	METABOLISM OF BIOMOLECULES	Enzyme	➢ This unit would unravel different detailed aspects of Enzymes; which would cover general properties, nomenclature and classification, importance of different terms like Coenzymes, Cofactors, Isoenzyme and Allosteric Enzyme ➢ Students would also learn about Mechanism of catalysis which includes Proximity and Orientation effects, Acid base Catalysis, Covalent Catalysis and Metal ion catalysis and Transition state analog ➢ To understand Enzyme Kinetics with main focus on Michaelis–Menten equation and Enzyme Inhibition: Mechanism and ➢ To develop understanding about mechanism involved in Enzyme Regulation with main focus on Covalent and Allosteric Regulation
		Metabolism - 1	➢ Metabolism is an important component of Living system and evolution. Students w learn in detail about carbohydrate Metabolism with focus on Glycolysis, fate of pyruvate, keys enzymes involved in regulation of glycolysis ➢ To understand how TCA cycle operates in the living system and their regulation ➢ To develop understanding about other important pathway Gluconeogenesis and HM Lipid Metabolism: β-oxidation of fatty acids and their importance ➢ To study in detail about electron transport chain and Oxidative Phosphorylation
		Metabolism - 2	➢ Protein is an important functional unit of our life. This unit would be focused on Protein Metabolism: Transamination, Decarboxylation and Deamination ➢ Student will learn about urea cycle which is important pathway of protein metabolism ➢ Student will learn about biosynthesis of Nucleic acid

			➢ To study in detail about Photosynthesis ➢ Student will learn about Inborn Errors of Metabolism
		Hormones	➢ To understand in detail about hormones involved in animal and plants system, ➢ To study different types of hormones based on site of action ➢ To explore types of plant hormones and their function ➢ To learn in detail about animal hormones and its function ➢ To learn in detail about disorders associated with hormonal imbalance in humans. Being important component of physiology, their deficiency could cause development of different types of disorders.
		Molecular transportation and signalling	➢ Semi permeability of membrane is unique feature of living system. Transportation and signal transduction was important process evolved due to virtue of semi permeability of membrane. ➢ To understand in detail about Composition and architecture of membrane ➢ To study how molecular transportation of Solute occurs across membrane ➢ To understand process of signal transduction and different pathways involved in the signal transduction. It would help students to understand importance of G protein and G protein coupled receptor in signal transduction. ➢ To study in detail about hormones and protein kinase associated pathways in signal transduction
Semester-4	ENVIRONMENTAL BIOTECHNOLOGY AND BIOSTATISTICS	Ecosystem and its component	➢ To understand in detail about ecology and ecosystem, types and subtypes of ecosystem. ➢ To gain knowledge about different types of Terrestrial and aquatic Biomes would improve the understanding about planet earth where we live. ➢ The knowledge about Biogeochemical Cycles: would help students to appreciate and to understand how different atoms participates in the process of recycling of elements, human activities can contribute to pollution. ➢ Biodiversity is important and unexplored area of research. The study of different factors affecting biodiversity and efforts taken by different organization to conserve Biodiversity, would help students to appreciate the unexplored areas of research as career opportunities. ➢ The study of Interaction within, between & among populations would help students to understand the value how nature operates.

			➢ The study Population Ecology, Population characteristics, Models of population growth and Interactions would help student to know how population dynamics works
		Environmental pollutions and its remedies	➢ This unit will help students to understand different types of pollutions and its hazards. It would bring awareness among students and contribute the cause in the productive. ➢ To study different types of factor which influences diversity of metabolic processes among bacteria ➢ The student will study Bioremediation, Biodegradation of Hydrocarbon & Xenobiotics e.g. DDT, Nitrobenzene ➢ The student will also study process of biomagnification and its implications
		Microbial Application in Environment	➢ This unit would be focused how biotechnology can be used remedial measure to protect environment. ➢ To study Physical, Chemical & Biological properties of water and waste-water ➢ To study different stages of waste water treatment process e.g. primary, secondary and Tertiary treatment processes ➢ Also, to study advance treatment techniques which includes solid wastes (Anaerobic digestion and composting) ➢ To study how microbes can be used in the development of Biofertilizers, Biocontrol, Bioleaching and Bioplastics
		Biostatistics - 1	➢ Biostatistics is very important subject in the field of research as well as in biotechnology industry. The unit would help to understand the Scope and applications of Biostatistics ➢ It would also help to understand the important concepts of Samples and population concept. Also, collection, processing and presentation of data ➢ Student will learn about descriptive statistics with focus on Frequency distribution, Measures of Central tendency, with respect to their merits, demerits their applications,

			➢ It would be focused on Measures of dispersion and their types. Student will learn about merits, demerits and applications of Range, Variance, Standard Deviation, Coefficient of Variance
		Biostatistics - 2	➢ Students would learn about Correlation and Regression analysis, which is very important topic for quantitative experiments performed in routine practical. ➢ To understand Probability and Conditional probability, Theoretical Distributions and their types and properties of Binomial, Poisson distribution, Normal distribution. ➢ Student would learn about inferential statistics and their application in biology. They will also learn about different types of test statistics (T-test, Chi square test and ANOVA) their applications in biology Student's t-test - introduction and application in biology

TY BSc Biotechnology 5th SEMESTER

BT 501
Unit – 1 Basics of industrially important microorganisms and techniques to isolate such organisms.
Strain improvement technique to get more productive strains.
Unit – 2 Ideal design of fermentor and bioreactor with various types and functioning of them.
Understand the importance of starter culture in fermentation industry.
Unit – 3 We understand the component of different types fermentation media and optimisation of media components.
How automation is used in fermentation industry.
Unit – 4 Understand the functioning of different downstream processes and economics related to fermentation industry.
Unit – 5 Fermentation of different products such as alcohol, citric acid etc.
How immobilization is utilized in fermentation.

BT 502
Unit – 1 Understand the classical genetics i.e. Mendelian genetics and inheritance patterns.
Basic terminology of genetics and sex determination systems.
Unit – 2 Basics of population genetics, maternal inheritance patterns.
Ultrastructure of DNA and alternative forms of DNA with central dogma of life.

Unit – 3 Understand the process of replication and DNA repair mechanism.
Mechanism by which gene transfer and recombination takes place. Concept of transposable elements.
Unit – 4 Process of gene expression and modification of RNA and polypeptide during expression process.
Understand how genes are regulated.
Unit – 5 Understand the concept of gene cloning and application of genetic engineering.

BT 503
Unit – 1 History of immunology and basics of immunity, hematopoiesis process.
Understand different cell and organs involved in immune system.
Unit – 2 Understand the structure, functions and classification of antigen and antibody.
Antigen-antibody reactions and their applications in life sciences.
Unit – 3 Understand the concepts of MHC molecules, B cell and T cells.
Unit – 4 Properties, component and functions of cytokines and complement system.
Understand the concepts of inflammation and vaccines.
Unit – 5 Understand how immune system responses to infectious diseases, immunodeficiency disorders, autoimmune diseases.
Concepts of graft rejection and immunosuppressive drugs.
Understand hypersensitivity reactions.

BT 6th SEMESTER

BT 601
Unit – 1 Introductory part of plant tissue culture techniques & it's applications in terms of biotechnological aspects.
Unit – 2 Understand the principle of different plant tissue culture techniques with it's applications.
Unit – 3 Techniques for transfer or amplification of the gene for achieving desired characteristics in plant to get more or improved products.
Unit – 4 Introduction & overview of animal tissue culture techniques with media and other required materials.
Unit – 5 Various applications of animal tissue culture techniques.

BT 602
Unit – 1 Introduction of analytical techniques & it's types for analysis of bioproducts of research experiments.
Unit – 2 Details of centrifugation for cell mass separation & Analysis of genetic material by applied agarose gel electrophoresis techniques
Unit – 3 Different types of spectroscopy techniques to identify functional group & measure biophysical characteristics of molecules
Unit – 4 Different procedure of tissue culture in enzymatic as well as non-enzymatic treatments with biotechnology output

Unit – 5 Maintainance & preservance of the animal tissue cultures for long term experimental output

BT 603
Unit – 1 Amplification techniques of desired gene to achieve novel research output in co-ordination of various sciences
Unit – 2 Different techniques of applied molecular biological overview
Unit – 3 Different applied techniques for molecular biology with introductory primary databases for interpretation of results
Unit – 4 Introduction of various bioinformatic software for analysis of biomolecules of nucleic acid & protein like various biomolecules
Unit – 5 Various software for structural & functional knowledge of various biomolecules

BSC COMPUTER SCIENCE

No.	Topics	Learning Outcomes
COURSE:	BSC Computer Science	
SEM-1	CA:101 Computer Fundamentals and Programming in C	
CHAPTER - I	Introduction to Computers, Number System and Codes	Students will get aware about computer basics, different types of computer, history of computer, different number systems and conversions between them and also computer codes.
CHAPTER - II	Emerging Technologies and Virus, Important Terms of Computer	They will be having clear idea about different communication method, communication devices and virus. They will be known to the concept of cloud computing and many more computer terms like Hard copy, soft copy, speed measurement of different hardware components.
CHAPTER - III	Pre-Programming Technique, Getting Started with 'C' Language	After learning this chapter students will get to know all about different types of programming languages. They will use tools and techniques of problem analysis like flowchart and algorithm. Also get knowledge of C Programming Languages and basics of the same.
CHAPTER - IV	Console based I/O and built-in functions, Decision Making and Looping Structure	They will have knowledge about using different library functions of C Language. Also they will learn looping structures and branching statement available in C Lang.
CHAPTER - V	Array, Pointer, and structure, UDF	Students will learn about how to create array, how to use array, use of pointer and working of structure. Also they will know how to create and use UDF.

No.	Topics	Learning Outcomes
COURSE:	BSC Computer Science	
SEM-2	CA:201 Advanced C and Object-Oriented Programming using C++	

CHAPTER - I	Introduction to Data Structure, Stack, Queue and Linked List	Students will get to know about linear and non-linear data structure concept, concept and implementation of different searching and sorting techniques. They will learn concept of prefix, infix and postfix expressions. They will have clear idea about the concept of Stack, Queue and Linked list along with how to implement their programs.
CHAPTER - II	Introduction to C++, Classes and Objects	This chapter describes the basic concepts of Object Oriented Programming. Benefits and Applications of OOP. Students will get to know basics of C++ and will learn the basic structure of C++ Program with operators, default arguments, inline functions and function overloading.
CHAPTER - III	Constructors, destructor and Inheritance	From this chapter students will learn about constructor, its types, destructor. They will get aware about difference between constructor and destructor. They will learn the concept of inheritance and also implementation of inheritance in programs.
CHAPTER - IV	Polymorphism and Operator Overloading, Managing console I/O operations	They will learn concept about polymorphism, virtual function, operator overloading, etc. they will be able to manage I/O Operations using functions like width(), precision(), setw() etc.
CHAPTER - V	Working with files, Exception handling	They will get to know about stream operations, working with single and multiple files using open() etc functions. They will learn concept of Exception Handling, how to specify exceptions, mechanism of exception handling etc.

No.	Topics	Learning Outcomes
COURSE:	BSc Computer Science	
SEM-3	CA: 301 Networking and Internet Technology	
CHAPTER – I	Basics of Internet and Network	• Understand the basic architecture, model and types of networking. Able to manage and setup a small network. • Identify and manage the services of a network along with the best available topology for different environment and infrastructure. • Identify the different types of network topologies and protocols.

		• Build an understanding of the fundamental concepts of computer networking. • Understand the payment systems for E – commerce along with the concern of data security with the knowledge of cookies. Identity the need and use of web hosting.
CHAPTER - II	HTML	Able to: • Insert a graphic within a web page, Create a link, table within a web page. • Insert heading levels, ordered and unordered lists within a web page. • Create, Validate and Publish a web page. • Use knowledge of HTML code and an HTML editor to create personal and/or business websites following current professional and/or industry standards. Use critical thinking skills to design and create websites.
CHAPTER - III	CSS	• Use knowledge CSS to create personal and/or business websites following current professional and/or industry standards. Create internal and external style sheet, Use cascading style sheets.
CHAPTER - IV	HTML 5 and CSS 3	Understand the principles of creating an effective web page, including an in-depth consideration of information architecture. MAP HTML using DOM Create dynamic styles and animation on a web page. Creates regular expression for form Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice. Develop skills in analysing the usability of a web site. Understand how to plan and conduct user research related to web usability. Understand the techniques of responsive web design, including media queries.
CHAPTER - V	JavaScript	• Develop basic programming skills using Javascript • Able to Demonstrate knowledge of introductory programming concepts. • Completion of a multi-page web site implementing a variety of JavaScript techniques Create computational formulas with the Javascript programming language, which utilizes logical operations and mathematical expressions including values, constants, variables, operators, functions, arrays, objects and other regular expressions.

No.	Topics	Learning Outcomes
COURSE:	BSc Computer Science	
SEM-4	CA:401 Programming with java	
CHAPTER – I	History, Introduction and Language Basics	• Basics terminology and commands of OOP language • Create, compile, and execute simple programs using the Java developer's kit (JDK) and its setup process. To develop basic programming skill,
CHAPTER - II	Inheritance, Java Packages	• Discussion of object-oriented concepts, including classes and basics of Java Programming Language. • Introduce branching and looping structures and to create subroutines that are referred to as methods in Java.
CHAPTER - III	Exception Handling and Threading, Streams (Input and Output)	• exception handling, input and output (I/O), • How to use control and iterative statements of • Use of Library Methods of Stream class
CHAPTER - IV	Applets, Layout Managers.	• Concepts like graphical user interface (GUI) programming, • Concept of an Applet • Advance Concepts of various layouts on applets
CHAPTER - V	GUI using SWING, Event Handling	• Various techniques of SWING, event-driven programs

No.	Topics	Learning Outcomes
COURSE:	BSc Computer Science	
SEM-5	CA: 501 RDBMS using Oracle	

CHAPTER – I	DBMS Overview, SQL,SQL*plus:	• Learning DBMS and RDBMS features • Learning Dr. E. F. Code Rules • Learning E.R.Diagram in Relational DBMS: • Learning Normalization • Learning SQL Commands and SQL Data Types • Learning SQL*PLUS • Learning SQL*PLUS formatting commands • Learning SQL Operators and Expression Learning difference between SQL and SQL*PLUS
CHAPTER - II	Managing Tables and Data	• Learning Creating , Altering & Dropping tables • Learning Data Manipulation Command like Insert, update, delete. • Learning different type of constraints and applying of constraints. • Learning SELECT statement with WHERE, GROUPBY and HAVING, ORDER BY, DISTINCT. • Learning Special operator e.g. IN, ANY, ALL,BETWEEN, EXISTS, LIKE. • Learning Join (Inner join ,outer join, self-join). • Learning Sub query, Minus, Intersect, Union. • Built in functions Numeric Function. • Character Function Date Function Aggregate function
CHAPTER - III	Other ORACLE Database Objects, Data Control & Transaction	• Learning View Sequence Synonyms • Learning control commands • Learning Database Links • Learning Index, Cluster. • Learning Creating user & role. • Learning Grant, Revoke command. • Learning transaction? • Learning Starting and Ending of Transaction Learning Commit, Rollback, Savepoint

CHAPTER - IV	Introduction to PL/SQL blocks and tables:	• Learning PL/SQL features. • Learning Block Structure Language construct of PL/SQL (Variables, Basic and Composite Data type, Conditions looping etc.) • Learning %TYPE and %ROWTYPE • Learning Using Cursor (Implicit, Explicit). • Learning Exception Handling. • Learning PL/SQL Tables, Nested Tables and varrays
CHAPTER - V	Advanced PL/SQL and Introduction to Oracle 12c:	• Learning Creating and Using Procedure, Functions. • Learning Package and Triggers. • Learning Managing Automated Database (Maintenance Task). • Learning Managing Resources with Oracle resource manager. Learning Oracle Scheduler Concept and Administration Oracle Scheduler
SEM-5	CA: 502 Web Programming using PHP	
CHAPTER – I	Web Programming and Web Services	Creation of static and dynamic web pages, knowledge of client side & server-side scripting languages, different types of web servers, learning of web concepts, different types of data interchange format like XML and JSON.
CHAPTER - II	PHP Basic	Introduction of PHP and all its basic concepts like variables, operators, conditional & looping structures, different types of built in functions like variable, math, string, array, file handling and miscellaneous functions, user defined functions and HTTP request methods.
CHAPTER - III	Handling Form, Session Tracking, PHP components & AJAX	Knowledge of handling forms with GET & POST methods, use of cookies, sessions, GD Library, Regular expressions. Learn to upload the files and send mail using PHP. Introduction of AJAX and building applications using AJAX with PHP, MySQL and JQuery
CHAPTER - IV	Introduction of SQL	Working with MySQL using PHPMyAdmin, different SQL DML statements and learning PHP MySQLi Connection building and all the database related built in functions.
CHAPTER - V	jQuery	Introduction of jQuery with its syntax, Learning different selectors, events and effects of jQuery with examples.
SEM-5	CA: 503 Software Engineering and Linux	
CHAPTER – I	System Analysis & Design	To learn introduction to System Analysis & Design and its different terms To learn SDLC and Fact – finding techniques

		To understand the Tools for Documenting Procedures and Decisions To learn and implement DFD and UML Diagrams using various case studies
CHAPTER - II	Software Development Life Cycle Models& Concepts of Quality Assurance	To learn various Software Development Life Cycle Models To understand the Concepts of Quality Assurance To learn Software Quality Models
CHAPTER - III	Software Project Management Plan & Software Testing	To learn Software Cost Estimation and its models To understand Scheduling and its Charts and Diagrams To understand Software Risk Management, Software Quality Plan To understand Software Testing and its terms To learn various Software Testing Methods To understand SRS with IEEE Format
CHAPTER - IV	UNIX Commands.	• The ability to understand what is an operating system and the role it plays • Explain the objectives and functions of modern operating systems. • Describe how operating systems have evolved over time from primitive batch systems to sophisticated multi-user systems • To understand the concepts of Unix OS • The ability to works on unix/Linux based OS commands • Describe and apply various command line utilities • Able to create file systems and directories and operate them • Ability to Login, from a terminal, a virtual terminal and remotely -Logout. • Understand and apply knowledge of absolute and relative path names when specifying files • Create and modify file permissions • Describe the standard file and directory layout The ability to work on Linux based editor.

CHAPTER - V	Shell Programming	• Able to understand the basic commands of Linux operating system and can write shell scripts • Understand the concept of shell parameters and variables • Create, view and delete shell variables-Understand how processes are created and their attributes -Create foreground and background processes. • Understand and apply the following concepts and features to the writing of shell scripts:- Flow Control structures-Looping Control structures-Menu Control Structures Positional parameters and shifting-Expressions-Operators-Pattern matching • To install, configure and setup the desktop environment in Linux based OS(Ubuntu). • Gain root • Understand and control startup sequences • Enable/disable services at startup • To configure and work on window managers.

No.	Topics	Learning Outcomes
COURSE:	BSc Computer Science	
SEM-6	CA:601 Programming with C#	
CHAPTER - I	.NET Framework and Visual Studio IDE, Language Basics	Students will be known to .NET Framework, they will get aware of how to work with Visual Studio and how to use different components, they will get to know about basics of the C# language like operators, array, branching statements, loops etc.
CHAPTER - II	Class and Inheritance, Property, Indexer, Pointer, Delegate, Event, Collections	They will be able to define class and use various types of class members. Students will be able to implement concept of inheritance, to create events etc.
CHAPTER - III	Windows Programming	Students will get aware about GUI interface and how to create the same using C#. they will get aware of many windows controls that can be used in the design of windows forms.
CHAPTER - IV	Database Programming with ADO.NET	They will get to know about how to work with database and how to create an application with functionality of database storage.

CHAPTER - V	User Controls (Components), Crystal Reports, Setup Project	Students will know about more components of visual studio and also create their own controls to get used in the design of window form application. They will be able to provide reporting facility in the software they create and also learn how to create deployment package.
SEM-6	CA: 602 Multimedia	
CHAPTER – I	Starting with Photoshop	Student can learn • What is photoshop? • Basic of photoshop • Setting of preference in tools
CHAPTER - II	Working with Basic Tools	Student can learn • Different types of tools. • How to use tools? • Tools uses and practical performance.
CHAPTER - III	Working with special effects	Student can learn • Photoshop filters. • How to do path and text effects? • What is blending menu?
CHAPTER - IV	Introduction of CorelDraw & Page Layout.	Student can learn • What is CorelDraw? • Corel draw basics and tools. • Background Layout • How to do make logo? • How to prepare template and card?
CHAPTER - V	Designing Effect	Student can learn: • Logo designing effect • Design effects.
SEM-6	CA:603 Content Management System using WordPress	
CHAPTER - I	OOP	Different concepts of OOPs like class, property, visibility, constructor, inheritance and class constants are learned. Exercise based on Mysql database handling with OOPs concepts using PHP.

CHAPTER - II	Introduction, Installation & Configuration	Introduction of CMS & WordPress with its features, installation of WordPress, its file & directory structure, Dashboard overview, How to add, edit and delete page, category, post, tag, media files, user roles & capabilities, settings of WordPress, updating WordPress and Database structure.
CHAPTER - III	Theme, Widget, Plugin	Introduction, installation and activation of theme with its customization options. Introduction of widgets, widget area and widget management, learning different types of widgets. Introduction, installation and activation of plugin, learning different types of plugins useful for website.
CHAPTER - IV	Theme development	Learning Anatomy of a Theme: header.php, footer.php and sidebar.php - Template Files (style.css, index.php, page.php, home.php, archive.php, single.php, comments.php, search.php, attachment.php, 404.php, category.php, tag.php, author.php, date.php) - The Loop (have_posts (), the_post()) - Template Tags 1. General tags. 2. Author tags 3. Category tags 4. Link tags 5. Post tags 6. Post Thumbnail tags 7. Navigation Menu tags (wp_nav_menu()) 8. Conditional - functions.php file

Computer Bachelor of Computer Applications

1. Program outcomes

- Students should have a solid understanding of the fundamentals and application of Computer Programming theories in all of the primary sub-disciplines of Computers.
- Students should be able to design, test, implement and explain the results of Computer Programs.
- Students should be able to analyst fundamental theory subject and implements in practical.
- Students should be skilled in problem solving, critical thinking, and analytical reasoning including necessary numeracy skills.
- Students should be able to use and/or identify methods by which to solve computer programming problems.
- Students should be able to do how computer software, hardware, networking works in daily routine.
- Student should be able to do develop android application, website, testing of Programs and implementation in real life.

2. Program specific outcomes

BSc Computer Science

- Students should have a solid understanding of the fundamentals and application of Computer Programming theories in all of the primary sub-disciplines of Computers.
- Students should be able to design, test, implement and explain the results of Computer Programs.
- Students should be able to analyst fundamental theory subject and implements in practical.
- Students should be skilled in problem solving, critical thinking, and analytical reasoning including necessary numeracy skills.
- Student should be able to do develop android application, website, testing of Programs and implementation in real life.
- Student should be able to draw design and draw logo, image, template, editing of image and video and audio.
- Student can learn that how to do project development using SDLC Concepts.

No.	Topics	Learning Outcomes
COURSE:	BCA	
SEM-1	CS:01 Maths & Statistical Foundation of Computer Science	
CHAPTER – I	Determinants	Student can learn • Maths and stats basics

		• 2*2 and 3*3 oder Determinants • Properties of Determinants
CHAPTER - II	Matrices	Student can aware with • Type of matrices • Transpose of matrices • Addition, sub. and mul. of it.
CHAPTER - III	a. Co-ordinate theory b. Set theory	Student can learn in (a) • Quadrants and Axes • Distance between two points in R2. • Section formula Student can learn in (b) • Method of se theory • Operation of set theory • De morgan laws • Difference between two sets • Cartesian products
CHAPTER - IV	Measures of central tendency & dispersion	Student can learn • Mean value • Median and mode value of data and group data • Range • Standard deviation
CHAPTER - V	Arithmetic and Geometric progression	Student can learn • Sequence and series of ap and gp • Harmonic progression • Relation between AM GM and HM
SEM-1	CS:02 Problem Solving Methodologies and Programming In C	
CHAPTER – I	Intro. To C Language and Intro. To Logic Development tools	• To develop basic programming skill, • Logic Development using various methods
CHAPTER - II	Control Structure	• Basics terminology and commands of C language

CHAPTER - III	Library Functions	How to use control and iterative statements of C language in program.
CHAPTER - IV	Arrays, Structures	Concept of an Arrays • Advance Concepts like Structures and Unions,
CHAPTER - V	rs, File Handling	Memory management (DMA) and Pointers Simple sequential File handling
SEM-1	CS:03 Computer Fundamental and Emerging Technology	
CHAPTER – I	Introduction to Computers	• Identifies the principal components of a computer system. It also describes some examples of various generations of a computer along with the history. • It also helps in finding out how computers and the components within them carry out their allotted tasks, and one can also develop an understanding of how improvements in computer technologies have allowed computers to become smaller, more powerful and cheaper. Demonstrate familiarity with major events in computer history and apply their lessons to current and future technological and social developments.
CHAPTER - II	Input Devices	• It helps to understand the fundamental hardware components that make up a computers and state the effective use of computer technology. • Explains the relationships between the components of a computer and how data are transferred among the components. • identify the periferal devices outside computer. List several types of multimedia input devices and imedia input devices and discuss their purposes
CHAPTER - III	Output Devices	• Identify several types of output devices and explain their functions • Explain what source data automation is and discuss how scanners and other devices can be used to accomplish it. Discuss several types of multimedia output equipment
CHAPTER - IV	Numbering System and Codes	• Apply knowledge, skills, and multiple perspectives in new situations to analyze and formulate solutions to complex problems with confidence and creativity. It also helps to understand the structure of the number system and the relationship between numbers. Efficiently use Microsoft Office applications.

CHAPTER - V	Emerging Technologies and VIRUS	• Determine the accuracy and reliability of informational sources found online. • Demonstrate the different wireless technologies such as GSM, GPRS • Learn how computers, computer networks, and the Internet work so as to better utilize them in their lives and to the improvement of society. Implement computer security concepts to keep devices and information secure.
SEM-1	CS:04 Networking and Internet Environment	
CHAPTER – I	Introduction to Computer Network	• Able to describe the general principles of data communication. • Describe how computer networks are organized with the concept of layered approach. • Identify the importance of the ISO 7-layer reference model. • Explore basic protocols involved in wired/wireless communication process. • Describe how signals are used to transfer data between nodes. • Describe simple LAN with hubs, bridges and switches. • Describe how packets in the Internet are delivered.
CHAPTER - II	Application of Internet	• Able to Describe basic taxonomy and terminology of the computer networking area. • The ability to understand the E-commerce and E-Business. • Able to identify network attacks (denial of service, flooding, sniffing and traffic redirection, inside attacks, etc.) and basic network defence tools. • Able to differentiate between organizational security policies and security mechanism. • Able to understand the importance of ethics as a network security practitioner. • To understand the network security concepts and types of payment system.
CHAPTER - III	Basic of HTML & Advance HTML 5	Able to : • Describe fundamentals of HTML • Identify how to format your text. • Describe introduction to HTML5 and what basic web design is. • Demonstrate creating tables. • Demonstrate adding web links and images, audio, video and design web forms

		• Learn techniques of responsive web design, including media queries.
CHAPTER - IV	Cascading Style Sheet & CSS 3	• Use knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites following current professional and/or industry standards
CHAPTER - V	Java Script	Use critical thinking skills to design and create websites.

No.	Topics	Learning Outcomes
COURSE:	BCA	
SEM-2	CS:07 Data Structures using C	
CHAPTER – I	Algorithm Analysis, Advanced Concepts of C and Graph	To learn analysis of algorithm and its different terms To learn Advanced Concepts of C like Dynamic Memory Allocation using Pointers To understand Graph theory and learn its traversal techniques
CHAPTER - II	Sorting and Searching	To learn various sorting and searching techniques and its implementation using C language
CHAPTER - III	Introduction to data Structure, Elementary Data Structure	To learn various primitive, simple structures, linear and non-linear structures To understand Stack and its implementation To work with Queue and its implementation
CHAPTER - IV	Linked List & Implementation	To learn Linked List and its implementation using C language To understand Singly linked lists, merging and reversing of Linked List To work with Doubly and Circular Linked List To learn Applications of Linked Lists
CHAPTER - V	Tree	To learn objectives and properties of Tree in Data Structure To understand and implement Types of Tree implementation using Binary Tree, Binary Search Tree, Height Balanced Tree and B-Tree

SEM-2	CS:08 Web Programming	
CHAPTER - I	Web Programming and Web Services	Creation of static and dynamic web pages, knowledge of client side & server-side scripting languages, different types of web servers, learning of web concepts, different types of data interchange format like XML and JSON.
CHAPTER - II	PHP Basic	Introduction of PHP and all its basic concepts like variables, operators, conditional & looping structures, different types of built in functions like variable, math, string, array, file handling and miscellaneous functions, user defined functions and HTTP request methods.
CHAPTER - III	Handling Form, Session Tracking, PHP components & AJAX	Knowledge of handling forms with GET & POST methods, use of cookies, sessions, GD Library, Regular expressions. Learn to upload the files and send mail using PHP. Introduction of AJAX and building applications using AJAX with PHP, MySQL and JQuery
CHAPTER - IV	Introduction of SQL	Working with MySQL using PHPMyAdmin, different SQL DML statements and learning PHP MySQLi Connection building and all the database related built in functions.
CHAPTER - V	jQuery	Introduction of jQuery with its syntax, Learning different selectors, events, effects and methods of jQuery with examples.
SEM-2	CS:09 COA	
CHAPTER – I	Digital Logic Circuits	• To learn how computer logic gates and Boolean algebra will works. • How to use flip flops with gates. • This chapter will brief about how circuits made using gates and flip flops.
CHAPTER – II	Digital Component	• This chapters will give briefing about register and integrated circuits knowledge and how it integrates with gates and flip flops.
CHAPTER - III	Data Representation	• It will learn how to do arithmetic operation using binary and Boolean equation through different number systems. • We can also gain knowledge regarding error detection and parity checker in circuits.
CHAPTER - IV	CPU	• This chapter gives information regarding CPU, it’s a heart of computer. • We can learn organization of CPU and processing of memory stack.

CHAPTER - V	IOP	• We can learn basic functionality of input and output devices. • It will also give concept of DMA. • How DMA will work and controller IOP.
SEM-3	CS:10 SAD, SQA and Testing	
CHAPTER – I	SAD, SE and Concepts of Quality assurance.	• It will give knowledge about how systems will work with business, information and sub system. • What are the benefits of decision table and tree for options of choices in SAD? • SDLC life cycle concepts. • What are the qualities of software and types of it.
CHAPTER - II	Basics of SW Testing, types and verification and validation	• Students can learn how to do testing of program and project with different types of testing and modules using different methods.
CHAPTER - III	Software development models and Automated Testing	• Student can learn software model types for development of project. • How to do testing using software tools.
CHAPTER - IV	Projects Economics, Project Scheduling and tracking	• How to do project scheduling and tracking using software tools like Microsoft Project 2010. • It will give how student can do project scheduling according to project planned and track using timeline chart and network diagram.
CHAPTER - V	CAD Project mgmt. and UML	• Student can learn how to do diagram using SW tool like Microsoft Visio. • This diagram will help them to draw and analysis full software project activities.

No.	Topics	Learning Outcomes
COURSE:	BCA	
SEM-3	CS:13 SAD, SQA and Testing	

CHAPTER – I	SAD, SE and Concepts of Quality assurance.	• It will give knowledge about how systems will work with business, information and sub system. • What are the benefits of decision table and tree for options of choices in SAD? • SDLC life cycle concepts. • What are the qualities of software and types of it.
CHAPTER - II	Basics of SW Testing, types and verification and validation	• Students can learn how to do testing of program and project with different types of testing and modules using different methods.
CHAPTER - III	Software development models and Automated Testing	• Student can learn software model types for development of project. • How to do testing using software tools.
CHAPTER - IV	Projects Economics, Project Scheduling and tracking	• How to do project scheduling and tracking using software tools like Microsoft Project 2010. • It will give how student can do project scheduling according to project planned and track using timeline chart and network diagram.
CHAPTER - V	CAD Project mgmt. and UML	• Student can learn how to do diagram using SW tool like Microsoft Visio. • This diagram will help them to draw and analysis full software project activities.
SEM-3	CS:14 OOP using CPP	
CHAPTER – I	Principal of OOP and control statements	• Basics terminology and commands of OOP language • Differences between POP and OOP. To develop basic programming skill.
CHAPTER - II	Class, Object and Constructor - Destructor	• Discussion of object-oriented concepts, including classes and objects. • Introduce constructor and Destructor functioning create subroutines that are referred to as functions in C++.
CHAPTER - III	Operator overloading, Type conversion and Inheritance	• Operator overloading and handling, input and output (I/O), • Basics of Inheritance concept in OOP.
CHAPTER - IV	Use of Pointer, Virtual Functions, RTTI	• Use of Library Functions of Stream class • Concepts of Virtual Functions and its Programming, • Concept of an RTTI

CHAPTER - V	Working with files and Exception Handling, STL	• Various techniques file handling, • exception handling programs, Use of STL
SEM-3	CS:15 RDBMS using ORACLE	
CHAPTER – I	DBMS Overview	• Understand terms related to database design and management • Understand the objectives of data and information management • Understand the database development process and the relational model and relational database management system. Implement relational databases using a RDBMS.
CHAPTER - II	Managing Tables and Data	• *Identify* the basic concepts and various data model used in database design ER modelling concepts and architecture use and *design* queries using SQL. • *Recognize/* identify the purpose of query processing and optimization and also demonstrate the basic of query evaluation. • Formulate query, using SQL, solutions to a broad range of query and data update problems. Retrieve any type of information from a data base by formulating complex queries in SQL.
CHAPTER - III	Other ORACLE Database objects	• *Apply* and *relate* the concept of transaction, concurrency control and recovery in database. • Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database. Build indexing mechanisms for efficient retrieval of information from a database.
CHAPTER - IV	Introduction to PL/SQL	• Develop efficient PL/SQL programs to access Oracle databases. • Able to Use some of the Oracle supplied PL/SQL packages to generate screen and file outputs. • Develop Design modular applications using packages. • Invoke native dynamic SQL to build runtime SQL statements. • Manage data retrieval with cursors and cursor variables. Investigate techniques for tuning PL/SQL code

CHAPTER - V	Data resource management and task scheduling	• *Apply* recovery system and be familiar with introduction to web database, distribute databases, data warehousing and mining. Understand the basics of data management and administration
SEM-3	CS:16 Content Management System using WordPress	
CHAPTER - I	OOP	Different concepts of OOPs like class, property, visibility, constructor, inheritance and class constants are learned. Exercise based on Mysql database handling with OOPs concepts using PHP.
CHAPTER - II	Introduction, Installation & Configuration	Introduction of CMS & WordPress with its features, installation of WordPress, its file & directory structure, Dashboard overview, How to add, edit and delete page, category, post, tag, media files, introduction of Guttenberg with its different blocks, user roles & capabilities, settings of WordPress, updating WordPress and Database structure.
CHAPTER - III	Theme, Widget, Plugin	Introduction, installation and activation of theme with its customization options. Introduction of widgets, widget area and widget management, learning different types of widgets. Introduction, installation and activation of plugin, learning different types of plugins useful for website.

CHAPTER - IV	Theme development	Learning Anatomy of a Theme: header.php, footer.php and sidebar.php - Template Files (style.css, index.php, page.php, home.php, archive.php, single.php, comments.php, search.php, attachment.php, 404.php, category.php, tag.php, author.php, date.php) - The Loop (have_posts (), the_post()) - Template Tags 1. General tags 2. Author tags 3. Category tags 4. Link tags 5. Post tags 6. Post Thumbnail tags 7. Navigation Menu tags (wp_nav_menu()) 8. Conditional Tags - functions.php file
CHAPTER - V	Advanced development	- Advanced functions (add_action(), add_filter(), add_shortcode(), do_shortcode(), register_nav_menu()) - Custom Post Types (register_post_type(), register_taxonomy(), Display custom Post Type & Taxonomy) - Widget Area (register_sidebar(), dynamic_sidebar())

No.	Topics	Learning Outcomes
COURSE:	BCA	
SEM-4	CS:19 Programming with java	
CHAPTER – I	History, Introduction and Language Basics	• Basics terminology and commands of OOP language • Create, compile, and execute simple programs using the Java developer's kit (JDK) and its setup process. To develop basic programming skill,

CHAPTER - II	Inheritance, Java Packages	• Discussion of object-oriented concepts, including classes and basics of Java Programming Language. • Introduce branching and looping structures and to create subroutines that are referred to as methods in Java.
CHAPTER - III	Exception Handling and Threading, Streams (Input and Output)	• exception handling, input and output (I/O), • How to use control and iterative statements of. • Use of Library Methods of Stream class
CHAPTER - IV	Applets, Layout Managers	• Concepts like graphical user interface (GUI) programming, • Concept of an Applet • Advance Concepts of various layouts on applets
CHAPTER - V	GUI using SWING, Event Handling	• Various techniques of SWING, event-driven programs
SEM-4	CS:20 Programming with C#	
CHAPTER - I	.NET Framework and Visual Studio IDE, Language Basics	Students will be known to .NET Framework, they will get aware of how to work with Visual Studio and how to use different components, they will get to know about basics of the C# language like operators, array, branching statements, loops etc.
CHAPTER - II	Class and Inheritance, Property, Indexer, Pointer, Delegate, Event, Collections	They will be able to define class and use various types of class members. Students will be able to implement concept of inheritance, to create events etc.
CHAPTER - III	Windows Programming	Students will get aware about GUI interface and how to create the same using C#. they will get aware of many windows controls that can be used in the design of windows forms.
CHAPTER - IV	Database Programming with ADO.NET	They will get to know about how to work with database and how to create an application with functionality of database storage.
CHAPTER - V	User Controls (Components), Crystal Reports, Setup Project	Students will know about more components of visual studio and also create their own controls to get used in the design of window form application. They will be able to provide reporting facility in the software they create and also learn how to create deployment package.
SEM-4	CS:21 Network Technology and Administration	

CHAPTER – I	Basics of Network, model and LAN sharing	• Understand the basic architecture, model and types of networking. Able to manage and setup a small network. • Identify and manage the services of a network along with the best available topology for different environment and infrastructure. • Identify the different types of network topologies and protocols. Build an understanding of the fundamental concepts of computer networking.
CHAPTER - II	Transmission media, multiplexing and switching concept, network devices	• Identify the different types of network devices and their functions within a network. • Explain the types of transmission media with real time applications • Understand and building the skills of subnetting and routing mechanisms. Understand how signals are used to transfer data between nodes.
CHAPTER - III	Network protocols and routing	• Understand and explain Data Communications System and its components. • Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation. • Design and implement a network protocol. • Classify the routing protocols and analyse how to assign the IP addresses for the given network. Design IP Addressing and Select suitable Routing Protocols for the Network
CHAPTER - IV	IP addressing and windows 2008 server	• Familiarize the student with the basic taxonomy and terminology of the computer networking area. • Able to Design logical sub-address blocks with a given address block. Understand how packets in the Internet are delivered.
CHAPTER - V	Basic of network security, internet connection and sharing	• Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication

		• Identify information security goals, classical encryption techniques Apply network security basics, analyses different attacks on networks and evaluate the performance of firewalls and security protocols
SEM-4	CS - 22 : Operating Systems Concepts With Unix/ Linux	
CHAPTER 1	Introduction, Process Management, Memory Management •Meaning of OS •Functions of OS •Features of OS •OS Types (User Point of View) •OS Types (Features Point of View)	Able to understand what is an operating system and the role it plays. A high-level understanding of the structure of operating systems, applications, and the relationship between them. Exposure to some details of major OS concepts.
	• Introduction of OS process • Process State Transition Diagram • Process Scheduling • FCFS • SJN • Round Robin • Priority Base Non Preemptive • Priority Base Preemptive	To describe different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. Distinguishing between long, medium, and shortterm scheduling. Assessing the performance of different scheduling policies.
	• Physical Memory and VirtualMemory • Memory Allocation • Contiguous Memory Allocation • Noncontiguous Memory Allocation • Virtual Memory Using Paging Virtual Memorv UsinQ Se mentation	To describe different memory management techniques like paging, segmentation and demand paging etc. To describe multiprocess and multithread programming techniques Analyze the relationship between the operating system and the hardware environment in which it runs.
CHAPTER – II	Getting Started with Unix, Unix Shell Command, Text Editing With vi Editor. •Unix Architecture •Unix Features	Differentiating and categorizing the key functions of an unix operating system (OS). Describe the types of unix based OS files

	•Types Of Shell (C, Bourn, Korn) •Unix File System •Types Of Files • Ordinary Files • Directory Files • Device Files •Unix File & Directorv Permissions	Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System Demonstrate the file and directory commands in client and admin side.
	• Connecting Unix Shell : Telnet • Login Commands passwd, logout, who, who am i, clear • File/ Directory Related Command Is, cat, cd, pwd, mv, cp, In, rm, rmdir, mkdir, umask, chmod, chown, chgrp, find,pg,more,less,head,tail,wc,touch • Operators in Redirection & Piping • < • >> • Advance Tools • Finding Patterns in Files grep,fgrep,egrep • Working with columns and fields cut,paste,join • Tools for sorting sort,uniq • • Comparing files : cmp,comm.,diff • Changing Information in Files : tr,sed, • Examining File Contents : ad	Able to : Create file systems and directories and operate them. Demonstrate UNIX commands for file handling and process control. Describe and apply various command line utilities Write Regular expressions for pattern matching and apply them to various filters for a specific task. Understand the significance of the seven fields of the ls –l output. Demonstrate changing of file permissions and ownership. Demonstrate the use of various grep and sed commands. Demonstrate various communications commands Able to make a remote connection with the help of telnet command The ability to work on Linux based editor. To demonstrate all the VI editor short cuts.

	• Tools for mathematical calculations bc,factor • Monitoring Input and Output tee.script • Tools For Displaying Date and Time cal.date • Communications telnet,wall,mtod,write,mail,news,finer • Process Related Commands: ps, command to run process in • background, nice,kill.at,batch,cron, crontab,wait,sleep • Concept of Mounting a File System mount command • Concept of DeMounting a File System umount command • Introduction of vi editor • Modes in vi • Switching mode in vi • Cursor movement • Screen control commands • Entering a text, cut, copy, paste in vi editor	
CHAPTER – III	• Shell Keywords • Shell Variables • System variables PS2, PATH, HOME,LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK • User variables set, unset and echo command with shell	Understand the concept of shell parameters and variables Create, view and delete shell variables-Understand how processes are created and their attributes -Create foreground and background processes. Understand and apply the following concepts and features to the writing of shell scripts:-Flow Control structures-Looping Control structures-

	variables
	• Positional Parameters
	• Interactive shell script using read and echo
	• Decision Statements
	  • if then fi
	  • if then else fi
	  • if then elif else fi
	  • case esac
	• test command
	• Logical Operators
	• Looping statements
	  • for loop
	  • while loop
	  • until loop
	  • break, continue command
	• Arithmetic in Shell script
	• Various shell script examples
		Menu Control Structures Positional parameters and shifting-Expressions-Operators-Pattern matching
		
		Able to write shell scripts programs

	• History of Linux • GNU, GPL Concept • Open Source & Freeware • Structure and Features of Linux • Installation and Configuration of Linux - Using with Ubuntu • Startup, Shutdown and boot loaders of • Linux	Able to differentiate GNU and GPL concepts. To install, configure and setup the desktop environment in Linux based OS(Ubuntu). Gain root Understand and control startup sequences Enable/disable services at startup

	• Linux Booting Process
	  ○ LILO Configuration
	  ○ GRUB Configuration
	• User Interfaces (GUI and CUI)
		Able to demonstrate Linux Booting process and configuration process.

CHAPTER - IV	Working with X- Windows (Ubuntu) • Layered Structure of X - Window Manager - Desktop Environment - Start Menu - User Configuration - startx Command • Window Managers -GNOME - KDE - Purpose of window manager • The KDE Desktop - KDE Panel - Desktop Icons - Managing Windows - The KDE Control Panel • TheGNOME Desktop - The GNOME Panel - Desktop Icons - Managing Windows - The GNOME Control Panel • Configuring X - /etc/X11/Xorg.conf file - Tuning Xorg.conf - Choosing a Window Manager • Create, Delete, Rename, Copy files and folders Install/ Uninstall Software	Able to configure and work on different types of window managers. Demonstrate KDE setup and GNOME desktop Install and Uninstall different Softwares. Demonstrate different types of configuration setup in Unix/Linux based OS. To work on files and folders of Linux based systems

CHAPTER – V	Linux Admin (Ubuntu): • Creating Linux User Account and Password • Installing and Managing Samba Server • Installing and Managing Apache Server • Optimizing LDAP Services • Optimizing DNS Services • Optimizing FTP Services • Optimizing Web Services • Configure Ubuntu's Built-In Firewall Working with WINE	Able to configure server side setup and manage different types of servers. Able to optimize LDAP, DNS,FTP,WEB services. Able to work on Ubuntu's built in Firewall -WINE

No.	Topics	Learning Outcomes
COURSE:	BCA	
SEM-5	CS:25 Advanced Java Programming (J2EE)	
CHAPTER – I	The J2EE Platform, JDBC (Java Database Connectivity)	To learn introduction to J2EE Platform, Enterprise Architecture Styles and J2EE terms To learn Database Connectivity Concepts in Java using JDBC and JDBC API To understand Graph theory and learn its traversal techniques
CHAPTER - II	RMI, Servlet	To learn distributed computing using RMI To work with its implementation using RMI API To learn web programming in depth J2EE using Servlet API To implement Servlet with JDBC
CHAPTER - III	JSP, Java Beans	To learn a complete Web Application implementation using JSP To implement JSP with JDBC To understand JavaBeans, its properties and methods

CHAPTER - IV	MVC Architecture, EJB, Hibernate	To learn MVC Architecture To understand EJB and its types To learn introduction to Frameworks in J2EE To understand Hibernate Framework in detail
CHAPTER - V	Spring, Struts	To learn introduction of Spring Framework To understand Spring Framework and its Architecture and important terms To learn introduction of Struts Framework To understand its comparison with MVC in Struts To know other important aspects of Struts
SEM-5	CS:26 Programming with ASP.NET	
CHAPTER - I	Framework and Web Contents Validation Controls	Students will get aware of Client-Server architecture, Web Servers, how to design ASP.NET page using different controls. They will also know how to apply validations on the input using validator controls.
CHAPTER - II	State Management	Identifying what is state management, different ways and different level of implementing state management in ASP.NET web site that includes creating and using cookies, session object, application object etc.
CHAPTER - III	ADO.NET and Database	Students will get aware about how to implement database connectivity using ADO.NET and allow ASP.NET application to work with database.
CHAPTER - IV	Master Pages and Theme, Caching Application, Page and Data	It allows them to identify need of Master Page, also how to create and use Master Page. Students will get to know how to create theme and apply the same to the ASP.NET web site. They will learn what is caching of output and how to use caching in ASP.NET application.
CHAPTER - V	Working with XML, ASP.NET Application configuration and Deployment of Application	By learning this topic, students will learn how to use XML files and also how to configure ASP.NET web site at the time of development. They will also have knowledge about how to deploy an ASP.NET website.
SEM-5	CS:27 Web Searching Technology and SEO	

CHAPTER – I	The Search Engines: Reflecting consciousness & connecting commerce search engine basics.	• Student can learn search engine basics and mission and vision of it. • Types of searchers also students can get it. • How to do click and eye tracking on search engine. • How to find searcher intent and relevant content related to your search.
CHAPTER - II	Determining SEO Objectives and Defining Site's Audience First Stages of SEO	• How to set goals and objectives? • How to plan site development using SEO strategies and methods? • Search engines operators and methods. • Student can learn how to do planning for identifying site development process and players. • What is SWOT analysis?
CHAPTER - III	Developing an SEO-Friendly Website	• How to accessible website through SEO strategies. • What is AI structure? • What id content management? • What is keyword targeting? • What is CMS? • above topics can learn by student through this chapter.
CHAPTER - IV	Keyword Research, Optimizing for Vertical Search	Student can learn • how to do keyword search using tools? • how to do site analysis? • How to do optimization of image, audio, video, news, blog and multimedia etc.
CHAPTER - V	Tracking Results and Measuring Success An Evolving Art Form: The Future of SEO	Student can learn • Future progress and evolution in search engine. • SEO as ART.

No.	Topics	Learning Outcomes
COURSE:	BCA	

SEM-6	CS:31 Mobile Computing using Android and iPhone	
CHAPTER – I	Introduction to Android Android Application Design	To learn introduction to Mobile Programming using Android and its different terms To learn Android Application Design To understand the Anatomy and Build a sample Android application
CHAPTER - II	Android User Interface Design	To learn various User Interface Screen elements To learn Designing User Interfaces with Layouts Working with Dialogs and Animation
CHAPTER - III	Database Connectivity Using SQLite and Content Provider	To learn Database connectivity using Android Data and Storage APIs To understand and implement data management using SQLite To know sharing Data Between Applications with Content Providers
CHAPTER - IV	Location Based Services (LBS), Common Android API, Notifications, Services, Deployment of applications	To learn Location Based Services using GPS To understand Android networking API, Android web API and Android telephony API To work with Notifications and Services To learn Application development using JSON in MySQL, Publishing and Deploying android application
CHAPTER - V	Introduction To iPhone	To learn iPhone programming using X-Code (IDE) To understand Framework, and Design User Interface To understand and implement creating And Building Simple Application To learn Cocoa Touch And MVC
SEM-6	CS:32 Data Warehousing with SQL Server 2012	
CHAPTER – I	Introduction to Data Warehousing	Student can learn • What is data warehousing? • What are future trends in DW? • Architecture of DW • What is data flow?

CHAPTER - II	Designing and Implementation of Data Warehousing	Student can learn • Logical and physical design of Data warehousing • Dimension and fact table of DW. • Design and implementation of DW.
CHAPTER - III	Creating ETL Solutions with SSIS, Implementing Control Flow in SSIS	Student can learn • How to create ETL with SSIS? • What is control flow and how to do implementation of it in SSIS?
CHAPTER - IV	Enforcing Data Quality, Extending SQL Server Integration Services	Student can learn • What is data quality? • What is SQL server? • What are integration services?
CHAPTER - V	Deploying and Configuring SSIS Packages, Consuming	Student can learn • What is SSIS and how to run and deployment of it. What is reporting, business and data analysis?
SEM-6	CS:33 Programming in Python	
CHAPTER – I	Introduction to Python	The basic elements of Python, branching programs, Strings and Input, Iteration, Functions and Scoping, Specifications, Recursion, Global variables, Modules, Files, Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries
CHAPTER - II	OOP using Python	Handling exceptions, Exceptions as a control flow mechanism, Assertions, Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding, Search Algorithms, Sorting Algorithms, Hashtables
CHAPTER - III	Plotting using Pylab	Plotting using PyLab, Plotting mortgages and extended examples, Fibonacci sequence revisited, Dynamic programming and the 0/1 Knapsack algorithm, Dynamic programming and divide and conquer

CHAPTER - IV	Regular Expression	Learning Special Symbols and Characters, Regexes and Python, A Longer Regex example (like Data Generators, matching a string etc.) Text Processing: Comma Sepearated values,JavaScript Object Notation (JSON),Python and XML Case Study: Create Regular expressions (Custom), Process telephone numbers, Generate log data, HTML Generators, Tweet Scrub, Amazone ScreenScrapper, Mailmerge
CHAPTER - V	Python and Data Analytics	Understand the problem By Understanding the Data Predictive Model Building: Balancing Performance, Complexity, and the Big Data

BA ENGLISH

Program: Bachelor of Arts (BA)

Students of BA Undergraduate Degree Programmes at the time of graduation will be able to:

PO1. Self-directed and Life-long Learning: Self-equipped to engage in independent and life-long learning in the broadest context of socio-cultural and technological changes.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Effective Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Evaluative Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO5. Ideal Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO6. Ethics: Recognize different value systems including one's own, understand the moral dimensions of one's decisions, and accept responsibility for them.

PO7. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO8. Digital Knowledge System: Adequate training in the application of digital knowledge in higher education and workplace.

PO9. Project Work and Oral Examination: Equip students to demonstrate their own work and to investigate their awareness in relation to the wider research field.

Program specific outcomes (PSO)

BA English Language and Literature

PSO1. To familiarize the students with select literary works across the globe, original or in translation

PSO2. To inculcate in the students active interest in English Language and Literature

PSO3. To enable the students to speak and write standard English

PSO4. To encourage and inspire the students into creative writing

PSO5. To make the students competent for different careers, home and abroad

Course outcomes (CO)

Foundation Course in English- FCE Semesters I to VI

- Students will learn language learning strategies.
- Students will be able to master various aspects of grammar.
- Students will develop conversional ability.
- Students would develop basic understanding of Indian culture and civilization through the selected texts.
- Students will learn comprehension of English and civilization through the selected texts.

Core Course in English (CCE 1) - Literary Form: Short Story

- The Core Course intends to allow the learners to specialize in the broad subject area
- acquire knowledge and skills pertaining to that area.
- This paper initiates the students into the literary field through the genre of short story.
- The objective of the paper is to familiarize the students with the form and with major creative writers
- To familiarize the genre and to hone their ability to comprehend and analyze English literary texts.

Core Course in English (CCE 2) - Literary Form: Lyric

- The Core Course intends to allow the learners to specialize in the broad subject area
- acquire knowledge and skills pertaining to that area.
- This paper initiates the students into the literary field through the genre of Lyric.
- The objective of the paper is to familiarize the students with the form and with major creative writers
- to familiarize the genre and to hone their ability to comprehend and analyze English literary texts.

Core Course in English (CCE 3)

- The Core Course intends to allow the learners to specialize in the broad subject area
  acquire knowledge and skills pertaining to that particular area.
- This paper will cover the history of English literature from 1400 to 1660. It aims to develop an understanding of the relevant socio-political and literary context of the given time span.
- The text will be taught in terms of thematic concerns as well as literary form, along with the connection of the text with the Age.

Core Course in English (CCE 4)

- To initiate the students in the study of poetry.
- To make students understand the importance of period and movement covered.
- To initiate the students in the study of technical side of poetry.
- To initiate the students in the study of figures of speech

Functional English I &III

- To initiate the students in the study of phonetics

- To make students aware about the vowels and consonants and their pronunciations
- To make students aware about human speech mechanism
- To strengthen students understanding of English speech pattern
- To make students aware about English accents
- To familiarize the students about intonation

Functional English II & IV

- Develop proficiency in English grammar: Students should be able to demonstrate a strong command of English grammar, including the ability to identify and use parts of speech, verb tenses, sentence structures, and other grammatical features accurately and appropriately.
- Analyze and evaluate grammar usage: Students should be able to analyze and evaluate grammar usage in various contexts, including literature, academic writing, and everyday communication, and apply their knowledge of grammar rules to improve their own writing and speaking.
- Apply critical thinking skills: Students should be able to apply critical thinking skills to evaluate arguments and ideas, recognize logical fallacies, and make well-reasoned judgments about the effectiveness of language use in different contexts.
- Develop lifelong learning skills: Students should be able to develop lifelong learning skills that enable them to continue learning and improving their English language proficiency even after completing the course, including the ability to use a variety of resources and tools to self-assess and improve their language skills.

Core Course in English (CCE 5)

- Students will study origin and development of genre Comedy
- Learn characteristics, elements, types of comedy
- Study the text 'Man and the Super man' by G B Shaw
- Critical evaluation of modern comedy
- To strengthen students' ability to appreciate literature and understand it.

Core Course in English (CCE 6) English Classics (Romantic Revival)

- Students would learn concepts of romanticism
- Study romantic poetry and novel
- Learn history and development of the novel and narrative poem
- To strengthen students' ability to appreciate and understand authors' time and works
- To strengthen students' ability to appreciate classic English literature and understand it with the texts *Emma* and St.Agnes

Core Course in English (CCE 7) Literary Criticism-I

- Learn elements, instincts and themes of literary writing

- Study concepts of literary criticism
- Differentiate different approaches to study literature
- Application of various literary theories on literary texts
- Differentiate literature of power and knowledge

Functional English V (FE 5) Conversational English

- Communicate effectively in written and oral English
- Learn tele-manners and apply it in daily conversation
- articulating their own ideas and questions clearly
- Students will be able to prepare, organize, and deliver an engaging oral presentation.
- Learn new idioms and phrases
- To strengthen students' ability to use English for day to day purposes.

Functional English VI (FE 6) Official/Business Correspondence

- Use proper format for all types of written business communication
- Write complete, concise, concrete, correct, clear, and courteous letters and memoranda
- Write appropriate resume, job application
- Learn advanced business communication

Core Course in English 8 (CCE 8) Indian Writing in English

- Students will learn history and development of Indian writing in English
- Be familiar to major Indian writers in English
- Study Indian culture and civilization through selected Indian texts
- Students will learn to compare Indian and western writing in English
- Appreciate Indian perspective framework

Core Course in English 9 (CCE 9) English Classics (Victorian Age)

- Display a working knowledge of the cultural and historical contexts of Victorian Age
- Identify and describe distinct literary characteristics of the time period
- Analyze literary works for their structure and meaning, using correct terminology and examples from different genres
- Significance of novels during Victorian era
- To strengthen students' ability to appreciate classic English literature and understand it through the Victorian prescriptive.

Core Course in English 10 (CCE 10) Literary Criticism - II

- Learn elements, instincts and themes of literary writing
- Study concepts of literary criticism
- Differentiate different approaches to study literature

- Study development of drama and other terminologies.
- Complete review on different genres in English literature

Functional English—Paper VII (FE 7) Translation Studies

- Students will history and development of translation studies
- Different kinds and strategies for translation
- Problems and challenges of translation
- Differentiate commercial and literary translations
- The significance and importance of translation studies in globalized world
- Students will come to know about the various types of translation.

Functional English—Paper VIII (FE 8) Communication and Business Writing

- Students will learn advanced level of communication
- Study verbal and nonverbal communication
- Learn report writing
- Learn formal business writing
- Develop additional vocabulary through the text

Core Course in English 11 (CCE 11) William Shakespeare

- To initiate the students in the study of Shakespeare
- To be able to critically appreciate the Shakespearean texts
- To develop critical acumen among the students for classics of literature

Core Course in English 12 (CCE 12) Literary Criticism – 1

- To strengthen students' critical acumen
- To develop students' ability to critically appreciate literature
- To make students understand various critics and critical concepts

Core Course in English 13 (CCE 13) The English Language & Chaucer

- Students will acquire a sound understanding of modern English and its evolution from old English to Modern English
- Student will have enough knowledge of Middle English
- Students will appreciate the Prologue to Canterbury Tales and develop an interest to read the stories in The Canterbury Tales

Core Course in English 14 (CCE 14) History of English Literature: Elizabethan Age to Neo- Classical Age)

- To impart historical perspective of the period
- To make students appreciate significant works of the period
- To hone students' literary sense

Core Course in English 15 (CCE 15) Literary Criticism – 2

- To strengthen students' understanding of the critical theories
- To make students conversant with the various critics and their contribution
- To give a historical perspective to students about the development of critical ideas

Core Course in English 17 (CCE 17) Modern Masters

- To enable the students to appreciate the great works of modern time
- To enkindle an interest in the modern literature
- To enable the students to understand the historicity of the works and the texts and understand them with historical perspective.

Core Course in English 18 (CCE 18) Literary Criticism – 3

- To strengthen students' critical acumen
- To develop students' ability to critically appreciate literature
- To make students understand various critics and critical concepts
- To make students understand various theories relevant to literature
- To make students understand various movements in English literature
- To make students understand the gradual growth of ideas

Core Course in English 19 (CCE 19) English Language, Phonetics and Literary Terms

- Students will acquire a sound understanding of the evolution of English Grammar.
- Students will have the conceptual clarity of the given literary terms and its historical background.
- Students will have a better understanding of the theory of the English phonology.

Core Course in English 20 (CCE 20) History of English Literature Romantic Age to Modern Age

- To make the students able to appreciate the works in the historical context
- To make the students aware about the historical development of English literature
- To make the students understand the significant writers of the age

Core Course in English 21 (CCE 21) Indian Poetics

- To initiate the students in the study of Indian poetics
- To make the students understand the basic principles of Indian poetics like Ras, Dhwani, Alankar etc
- To develop students' interest in the classical critical tradition of Indian poetics

Functional English—Paper VII (FE 7) Translation Studies

- Students will study the history and development of translation studies
- Different kinds and strategies for translation
- Problems and challenges of translation
- Differentiate commercial and literary translations
- The significance and importance of translation studies in globalized world

- Students will come to know about the various types of translation.

Functional English—Paper VIII (FE 8) Communication and Business Writing

- Students will learn advanced level of communication
- Study verbal and nonverbal communication
- Learn report writing.
- Learn formal business writing
- Develop additional vocabulary through the text

Functional English (FE 9) Introduction to Creative writing

- to help students understand creativity and the measurements of creativity
- understand creativity and problems, creative writing
- poetry as a creative process
- drama and novel and elements of creativity
- creative writers

Functional English— (FE 10) Application of English language to media

- To make the students aware about media and media studies
- To hone students' language skills for media
- To equip the students with skills necessary for various media
- To help them to understand the objective of advertisements and critically appreciate them

BBA

No.	Semester	Course	Course Outcome (for each course separately)
	1	Communication Skills & Business Writing	● Explain communication process ● Analyze the difference between various types of communication ● To overcome the barriers arise in the communication ● Draft notice, agenda and minutes of business administration ● Prepare presentations and strategies to deliver it effectively ● Draft the resume and CV for the job purpose
		Micro Economics	UNIT-1-Definition of economics ● Explain definition and history of Economics- classical, neo-classical and Scarcity ● Explain nature of economics ● Explain scope of economics ● Give brief idea of economic activities and non-economic activities UNIT-2-Theories of Demand and Supply ● Explain the meaning of demand and determinants of demand ● Explain demand schedule and demand curve ● Describe exceptions to the law of demand ● Explain meaning of supply along with factors affecting it ● Explain law of demand and law of supply ● Describe Elasticity of demand, its meaning and its types ● Explain factors affecting price elasticity of demand ● Describe practical significance of price elasticity of demand UNIT-3-Utility Analysis ● Explain utility analysis ● Distinguish between total utility and marginal utility ● Explain law of diminishing marginal utility ● Explain law of Equi-marginal utility UNIT-4-Market structure ● Describe market structure ● Give meaning of Market and its classification ● Explain meaning and features of perfect competition

			● Explain meaning and features of monopolistic competition ● Describe monopoly its features and its different types ● Clarify the concept of oligopoly ● Distinguish between different market structures
		Elements of Business Mathematics	Unit 1: Binomial Theorem ● State and prove binomial theorem. ● Expand the binomial in form of $(x + a)^n$. ● Find the value of $(101)^5$, $(51)^5$, $(19)^5$ etc. using the binomial theorem. ● Solve examples to find the particular term of binomial in form of $(x + a)^n$. ● Solve examples to find the middle term of binomial in form of $(x + a)^n$. ● Solve examples to find the coefficient of binomial in form of $(x + a)^n$. Unit 2 : Permutation and Combination ● Solve the factorial base examples. ● Define "Raw Permutation" and its properties and solve examples based on concept of "Raw Permutation." ● Define "Raw Permutation of like things" and solve examples based on concept of "Raw Permutation of like things." ● Define "Permutation with repetition" and solve examples based on concept of "Permutation with repetition". ● Define "Circular Permutation" and solve examples based on concept of "Circular Permutation". ● Identify the different alternative of arrangement in the case of arrangement of different things. ● Define "Combination" and solve examples based on concept "Combination". ● Identify the different alternative of selection in the case of selection of different things Unit 3: Arithmetic Progression and Geometric Progression ● Define Arithmetic Progression. ● Derive the formula of n^{th} term and sum of n terms of Arithmetic Progression. ● Solve examples based on the concept of the formula of n^{th} term and sum of n terms of Arithmetic Progression. ● Define Geometric Progression. ● Derive the formula of n^{th} term and sum of n term of Geometric Progression.

			● Solve examples based on the concept of the formula of n^{th} term and sum of n terms of Geometric Progression. Unit 4 : Mathematical Induction ● State the Mathematical Induction. ● By using Mathematical Induction prove the sum of n terms of different series. ● Verify the validity of different kinds of sequence and series. ● Find the formula for sum of n terms, sum of squares of n terms, sum of cubes of n terms. ● Using properties of the sum of n terms, sum of squares of n terms, sum of cubes of n terms, find the sum of series.
		Fundamentals of Management	Unit 1: Introduction to Business Management ● Clarify the concept of management and explain its significance ● Identify the major characteristics of management ● Compare management with Science and Art and comment on it ● Establish the fact that management is an emerging profession ● State the phases of management process ● Describe the managerial roles as given by Mintzberg Unit 2: Planning ● Define planning and clarify its concept ● Conceptualize difference between planning and plan ● Describe nature and importance of planning ● State the stages of planning process ● Clarify the concept of planning premises and classify its types ● Classify types of plans Unit 3: Organizing and Staffing ● Define the term organizing and organization ● Explain the main stages of organizing process ● Discuss the situational factors affecting organization structure ● Critically evaluate different forms of organization structure ● Clarify the concept of staffing and state its functions ● Discuss factors affecting staffing decision Unit 4: Directing and Controlling ● Define the term directing and explain its importance

			● Briefly explain different directing tools ● Clarify the concept of controlling ● State the main stages of controlling process ● Discuss the role of controlling
		Forms of Business Organization	UNIT 1- HUMAN OCCUPATIONS AND NATURE AND SCOPE OF BUSINESS ● Classify different human activities ● Differentiate between different economic activities ● Classify business activities ● Explain objectives of business activities. ● Explain different economic activities ● Explain various forms of business organisations. ● Briefly discuss effects of Industrial Revolution. UNIT 2- SOLE PROPRIETORSHIP AND PARTNERSHIP ● Explain the chief characteristics of Sole-proprietorship firm ● Critically evaluate Sole-proprietorship form of business. ● Briefly explain nature of partnership firm ● Critically evaluate Partnership form of business organisation. ● Explain the Dissolution of Partnership firm UNIT 3 – JOINT STOCK COMPANY AND COOPERATIVE SOCIETY ● Point out similarities and differences between a Company and a Cooperative Society. ● Describe different types of Companies that can be registered under the Indian Companies Act,1956 ● Critically evaluate joint Stock Company ● Critically evaluate Co-operative Society as a Form of Business organisation ● Explain the salient features of Company and Cooperative Society ● Describe various stages involved with formation of the company. ● Differentiate between a public company and a private company UNIT 4 – BUSINESS COMBINATIONS AND SPECIAL ECONOMIC ZONES ● Explain various types of business combinations in detail ● Explain various forms of business combinations. ● Explain advantages and disadvantages of SEZ ● Give out reasons or causes for business combinations

		Principles & Practice of Accounting	Unit I Give Definition of accounting ., Explain Nature, Scope and Objectives of Accounting. Explain Terms used in financial accounting Identify the Relationship of accounting with economics and statistics, Explain Role of Accountant. Explain Generally Accepted Accounting Principles, Accounting as a Measurement discipline, Business Transactions–Meaning and Classification, Classification of Account, Rules of Debit and Credit, Accounting equation Unit II Pass Journal Entries for various transactions. Prepare Ledger accounts, Posting and Balancing of Ledger Accounts Prepare Trial Balance Unit III Prepare Subsidiary books: purchase books, sales book Prepare purchase return book and sales return book Prepare Cash book Prepare petty cash books Unit IV Prepare Final Accounts; Trading account, profit and loss account, balance sheet, closing entries Pass adjustments entries Explain Accounting errors – Types of errors Rectify errors, and give the effect of errors on Final accounts.
		Environmental Science	Unit – 1: Environment and Environmental Science ● Define environment. Explain different types and structures of environment. ● Explain the different components of environment. ● Define environment science, its scope and principles. ● Description of ecology. ● What is ecosystem and its different types. ● What are the causes of environmental destruction.

			Unit 2: Natural Resources and Wealth A student should be able to learn and understand ● Meaning and types of resources ● The meaning of exploitation of resources and the reasons for greater exploitation ● Discuss problems arising as a result of exploitation ● How technology has adversely affected the environment ● Explain the concept of wealth and the difference between wealth and natural resources ● How natural resources can be converted into wealth ● Discuss anthropogenic waste and its sources ● Explain the consequences of anthropogenic waste on environment ● Explain the meaning of industrial waste and its effects Unit – 3: Environmental Degradation and Environmental Management 1. Explain environmental degradation. 2. Define the types and causes and effects of environmental degradation. 3. Describe the hazards and demerits of non-degradable and electronic waste. 4. Explain Environmental Management Systems. 5. Explain the environmental concerns in India and the goals of sustainable development. Unit 4: Disaster Management and Environmental Management System A student should be able to learn and understand ● Meaning of disaster management and guidelines for mitigation programs ● Discuss the commonly occurred natural disasters in India and mitigation measures ● State the working of state pollution control board ● What is the purpose, scope and process of environmental audit. ● Explain Environmental Management Systems (EMS). What are its process and benefits. ● What are eco-friendly products, green industry and carbon credits.
		Macro Economics	UNIT-1-Demographic Issues 1. Narrate demographic issues faced by our country 2. Explain the relation between size of population and economic development 3. Describe various concepts – Birth rate, Death rate, Life expectancy rate , density of population 4. Write down recent demographic trends in India 5. Explain the causes of large size of population and its effect on economic development 6. Explain current population policy

			UNIT-2-Inflation 1. Give meaning of inflation and deflation 2. Describe different types of inflation and its causes and effects 3. What are the measures to regulate inflation 4. Clarify the concept of price index along with its types UNIT-3-National Income 1. Explain the concept of National Income 2. Describe GDP,GNP & NNP, Personal Income, Personal Disposable Income, Money and Real Income 3. Clarify the recent trends of national income 4. Explain inequalities of Income- its cause, effect and remedies UNIT-4-International trade 1. What is trade 2. Distinguish between internal and international trade 3. Describe balance of trade and balance of payment 4. Explain devaluation of currency 5. Describe- dumping, Exchange rate, Tariff and Quotas
		Advanced Techniques of Business Mathematics	Unit 1: Matrix ● Define matrix and different types of matrix. ● Solve the examples based on matrix operations like addition, subtraction, multiplication of matrix. ● Solve the examples based on inverse of matrix. ● Find the solution of simultaneous linear equations using inverse of matrix Unit 2: Determinant ● Expand the determinant of order 2 x 2 and 3 x 3. ● Find the value of determinant of order 2 x 2 and order 3 x 3. ● Explain the properties of determinant. ● Find the solution of simultaneous linear equations using Cramer's Method Unit 3: Limit ● Define Limit of a function. ● Evaluate limit of the simple function like . ● Evaluate limit of the exponential function like ,.

			● Evaluate limit of the function like,. Unit 4: Compound Interest and Annuity ● Define simple interest. ● Calculate simple interest of certain principle. ● Define compound interest. ● Calculate compound interest of certain principle. ● Calculate simple interest and compound interest of certain principle for different period of interest. ● Calculate the effective rate of interest and nominal rate of interest. ● Define Annuity and different types of Annuity. ● Define present value and future value of annuity. ● Calculate present value and future value of annuity.
		Emerging Trends in Contemporary Management	Unit 1: Schools of Management Thought and Modern Management ● Classify main schools of management thoughts ● Discuss scientific management school highlighting its main features ● State principles given by Henry Fayol and discuss them in detail ● Explain in detail systems school of management ● Discuss contingency school of management Unit 2: Managing Employee Motivation ● Clarify the concept of motivation and identify its features ● Differentiate financial and non financial motives ● Explain the concept of job enrichment and state its techniques ● Discuss the concept of work life balance and identify its positive effects ● Explain managerial actions required for helping employees maintain work life balance ● Clarify the concept of job satisfaction and mention factors affecting job satisfaction Unit 3: Managing of Change ● Clarify the concept of change and explain its nature ● Discuss stages of planned change process ● Describe causes and remedies of resistance to change ● Explain the term change agent and discuss emerging role of change agent ● Differentiate internal and external change agents Unit 4: Some Issues in Managing Employees

			● Discuss the concepts of creativity and innovation and explain ways to promote creativity and innovation in an organization ● Clarify the concept of MIS and explain its process and importance ● Explain the concept of TQM and discuss its scope and significance
		Business Accounting	Unit - 1 Explain Accounting Standards Explain Objectives, Benefits, of Accounting Standards Board of India, Preparation of Accounting Standard Setting the Accounting Standards in India by Institute of Chartered Accountant of India (Introduction only) Unit – 2 Depreciation Accounting: Describe Concept and Methods of depreciation Classify Revenue and Capital expenditure Calculate Depreciation Prepare Accounts Valuation of Inventories: Explain the Concepts of Inventory and valuation methods. Determining the physical inventory estimate the inventory value Unit - 3 Accounts of non-profit making organization Differentiate Capital and Revenue Expenses Prepare Receipts and Payments Account Prepare Income and Expenditure Account Prepare Balance Sheet from the Receipt and Payment Account and other information given. Distinction between Receipt and Payments Account and Income and Expenditure Account Unit – 4 Unit Costing Explain Cost Concepts Prepare cost sheet and Estimated cost sheet

			Operating Costing Prepare cost sheet for service sectors like Hospital, Hotel and Theatre
		E-commerce	Unit – 1 ● Describe basic concept of E – Commerce ● Describe evolution of E – commerce ● Factors responsible for development of e-commerce ● Critically Evaluate e-commerce and traditional commerce ● Recent trends in e-commerce Unit – 2 ● Describe various models of e-commerce ● Different platforms for conducting e-business ● Discuss the challenges faced by traditional marketing in today's world ● Describe various tools/techniques of online marketing Unit – 3 ● Concept of credit card and its working process ● Describe the usefulness/importance of EFT ● Describe various key-dimensions of e-commerce security ● Discuss various kinds of threats and crimes committed on e-commerce ● Discuss various tools which protect data and information on internet Unit 4 ● Describe the concept of e-business and its nature ● Discuss the rise of e-business in the global world ● Critically Evaluate e-business and traditional business ● Discuss various ethical issues related to e-commerce ● Discuss origin and growth of m-commerce
		Practical studies	Students will be able to: ● understand the working of various department of an industrial enterprise ● understand production planning & control. ● locate industrial unit and design the plant layout. ● design man power planning and understand importance of employee relations. ● design marketing segmentation and marketing mix ● understand and manage working capital

			● do SWOC analysis of an industrial enterprise
	3	Personality Development & Corporate Skills	Students will be able to: ● To apply various soft skills in different situations practically ● solve questions related to various soft skills ● prepare SoPs ● solve questions related to sharemarket reports ● To develop and to maintain a positive attitude and being assertive ● solve questions based on verbal analogy
		Managerial Economics	UNIT-1-Definition of Managerial Economics & Demand forecasting 1. Define managerial economics 2. Explain nature of managerial economics 3. Explain scope of managerial economics 4. Explain demand forecasting and factors affecting it 5. Explain various methods of demand forecasting- survey and statistical methods UNIT-2-Production Analysis 1. Explain meaning of production and production analysis 2. Describe Isoquant curve 3. Explain iso-cost curve 4. Clarify economies and diseconomies of scale UNIT-3-Cost Analysis 1. Describe cost of production 2. Explain various concepts of cost- accounting cost, economics cost, opportunity cost 3. Differentiate between- fixed cost and variable cost, incremental cost and sunk cost 4. Explain cost output relation in long run and short run UNIT-4-Equilibrium of firm 1. Explain equilibrium of firm under perfect competition 2. Explain the equilibrium of firm under monopoly 3. Describe equilibrium of firm under monopolistic competition 4. Explain kinked demand curve under oligopoly
		Business Statistics	Unit 1 : Correlation Analysis ● Define correlation analysis and coefficient of correlation.

			● Explain the uses of correlation analysis. ● Explain the types of correlation. ● Explain the properties of correlation. ● Explain the scattered diagram method. ● Calculate the coefficient of correlation between two variables like price and demand, sales and profit etc. using Karl Pearson's Method. ● Calculate the coefficient of correlation between two variables using Spearman's Rank correlation Method. Unit 2 : Regression Analysis ● Define regression analysis and regression coefficient. ● Explain the uses of regression analysis. ● Explain the properties of regression coefficient. ● Explain the least square method. ● Calculate regression coefficient between two variables like price and demand, sales and profit etc. using least square method. ● Calculate two regression lines between two variables using least square method. ● Established the functional relationship between two variables like price and demand, sales and profit etc. ● Estimate the value of dependent variable given the value of independent variable. Unit 3 : Probability ● Define the different terms like random experiment, event, mutually exclusive event etc. used in probability. ● Define mathematical and statistical approach of probability. ● State and prove the addition and multiplication theorem of probability. ● Calculate the probability using addition and multiplication theorem of probability. ● State and prove conditional probability and Baye's theorem of probability. ● Calculate the probability using conditional probability and Baye's theorem of probability. ● Calculate the probability of different events under different condition. Unit 4 : Mathematical Expectation and Probability Distribution ● Explain the concept of random variable and probability distribution. ● Define the mathematical expectation of discrete random variable. ● Calculate mean and variance of discrete random variable.

			● Define probability distribution function of Binomial distribution. ● Explain the uses and properties of binomial distribution. ● Calculate probability using binomial distribution. ● Calculate mean and variance of binomial distribution.
		Principles of Marketing	Unit – 1: Introduction to modern marketing ● Identify core concepts of marketing and the role of marketing in business and society. ● Explain the evolution of marketing and the company orientation to marketing. ● Differentiate between Marketing and Societal concept. ● Differentiate between the selling and marketing concept. ● Define the elements of the marketing mix (4Ps). ● Explain the factors affecting the Marketing Mix. ● Explain how marketing contributes to the process of exchange. Unit – 2: STP - Segmentation, Targeting and Positioning ● Apply the introduced conceptual frameworks, theory and techniques to various marketing context. ● Define the concept and significance of market segmentation. ● Explain the different bases of segmentation. ● Explain the bases of segmenting industrial markets. ● Define target markets and the process of market targeting. ● Explain the concept and process of product positioning. Unit – 3: Consumer Behaviour ● Describe the concept of consumer behaviour and the role it plays in the marketing process. ● Detail out the factors affecting consumer behaviour. ● Describe the concept and stages of the buying decision process. ● Elucidate the managerial implications of the buyers' decision making process. ● To try and infuse a sense of curiosity to do research pertaining to marketing, to cope with the fast changing marketing environment. Unit – 4: Marketing Environment and study of competition ● The ability to analyse marketing problem and provide solution on a critical examination of marketing information. ● Elucidate the different factors that form the marketing environment. ● Determine the marketers' response to the changing internal and external environmental factors. ● Explain the concept and process of online marketing.

			● Enumerate the benefits and limitations of online marketing. ● Elucidate the importance of Green Marketing in the modern marketing arena. ● Explain the different Green Marketing efforts carried out by the Indian corporates. ● Explain the need and importance of competition analysis to a marketer. ● Learn to form marketing strategies for market leaders, market challengers, market followers, and market nichers.
		Human Resource Management	Unit 1: Human Resource Management A student should be able to learn and understand ● Explain concept and significance of human resource management ● Discuss functions of human resource management ● Comparative discussion between human resource management and personnel ● management ● Explain the role of human resource manager ● State the qualifications and qualities of human resource managers ● Discuss meaning, characteristics and objectives of human resource policy ● Explain methods of human resource accounting ● Discuss the changing environment and human resource management Unit 2: Acquisition of Human Resource A student should be able to learn and understand ● Concept of human resource planning ● Detailed explanation of the process of human resource planning ● Explain the significance of human resource planning ● Concept and uses of job analysis ● State sequential stages of job analysis ● Explain the concept of recruitment and its sources ● Discuss the concept of selection and the process of selection ● Explain the meaning of placement and the major placement problems ● Explain the meaning of induction and the significance of induction Unit 3 : Training and Development A student should be able to learn and understand ● Understand and define the term education, training and development

			● Identify training and development needs ● Illustrate and describe steps in designing a training programme ● Identify the importance /advantages of training ● Distinguish between on the job and off the job training and explain its merits and ● limitations ● Identify the various methods of training and analyse the merits and demerits of ● each method ● Define and detail the steps and methods of training evaluation ● Introduce the term management development and career development ● Discuss the scope of management development ● Discuss the steps in career development ● Write a short note on career development Unit 4 : Performance Appraisal A student should be able to learn and understand ● Define the terms performance appraisal, wage, salary, minimum wage, living ● wage, fair wage ● Explain the nature of performance appraisal ● Discuss the objectives of performance appraisal ● Classify the traditional and modern methods of Performance Appraisal ● Explain the various appraisal methods with their merits and limitations ● Enumerate and explain the methods of Job Evaluation and discuss its merits and ● demerits ● Analyze the factors influencing compensation levels ● Differentiate between time and piece wage method of wage payments ● Explain the methods of wage payments with their merits and limitations
		Financial Management	Unit 1: Introduction to Financial Management ● Conceptualize Financial Management ● Discuss nature of Financial Management ● Differentiate traditional approach and modern approach to the scope of Financial Management ● Discuss objectives of Financial Management ● Justify superiority of Wealth Maximization objective over Profit Maximization objective of Financial Management

			Unit 2: Sources of Finance ● Critically evaluate different sources of finance, viz. Equity Shares, Preference Shares, Debentures, Term Loans and Retained Earnings ● Clarify the concept of venture capital and discuss its need ● Explain the concept of lease finance and identify its practical relevance ● Discuss the concept of seed capital in present day context Unit 3: Capital Structure and Leverage ● Clarify the meaning of capital structure ● Differentiate financial structure and capital structure ● Compare and critically evaluate different patterns of capital structure ● Explain the concept of ideal capital structure and identify the characteristics of an ideal capital structure ● Elucidate determinants of capital structure ● Conceptualize over capitalization and under capitalization ● Discuss symptoms, causes of over capitalization and under capitalization ● Examine effects and remedies of over capitalization and under capitalization ● Calculate and interpret operating, financial and combined leverage ● Explain significance of EBIT,EBT and EPS Unit 4: Cost of Capital ● Explain the cost of capital and its significance ● Classify cost of capital ● Compute cost of equity, cost of preference capital, cost of debt and cost of retained earnings ● Calculate weighted average cost of capital
		Corporate Accounting & Practices	Unit 1: AMALGAMATION OF COMPANIES: ● Explain amalgamation as per AS14 ● Explain Purposes and Legal guideline of Companies Act-2013 ● Accounting treatment as per Indian Accounting Standard: 14 ● Journal Ledger Entries-Vertical Balance sheet after Amalgamation Unit 2: ABSORPTION AND RECONSTRUCTION OF COMPANIES: ● Explain Meaning and Concepts of absorption ● Explain Purposes and Legal guidelines of Companies Act-2013 ● Accounting treatment as per Indian Accounting Standard: 14

			● Journal Ledger Entries-Vertical Balance sheet after Absorption Unit 3: Analysis and Interpretation of Financial Statements & Ratio ● It helps students to understand the concept of analysis and interpretation of financial statements of Companies. ● Students get clear ideas about utilities and limitations about Ratio analysis and its practical usefulness in decision making for the company and its stakeholders. ● It clears students about traditional and functional classification of different Ratios and its impacts in preparation of final accounts. ● It helps students to visualize financial statements as an investor. ● It enhances sense of wisdom of students for interpreting financial data of a company. Unit 4: Final accounts of company ● Give differences between Horizontal and Vertical presentation of Final accounts ● Mention Provisions, Reserves and Capital Reserves - Divisible profits and dividend ● Prepare of final account in Horizontal form only
	4	Entrepreneurship Development & Ethics	Unit – 1 ● Discuss the origin of entrepreneurship and its functions ● Discuss operational visibility of John Kao's Model of Entrepreneurship ● Describe concept of Franchising and various types of franchising ● Discuss contents of franchising contract ● Discuss merits and demerits of Franchising Unit – 2 ● Describe EDP and its nature ● Describe phases of EDP ● Critically Evaluate of EDP ● Discuss Government's role in development of EDP ● Discuss financial support of government to entrepreneurs ● Describe role played by commercial banks in development entrepreneurship Unit – 3 ● Discuss the concept and importance of Start - Up ● Explain start-up India policy ● Role of specialized institutions at National and State Level for Entrepreneurship Development ● Describe need and progress of Women Entrepreneurship

			Unit – 4 ● Discuss the concept of ethics and business ethics ● Why do ethical problems occur in business? ● Describe various principles of ethics ● Discuss moral issues taking place in business ● Importance of virtue in ethical behaviour
		Economics for Decision Making	UNIT-1-Introduction to Competition & Break even Analysis ● Differentiate between price competition and non price competition ● Clarify predatory and discriminatory competition ● Analyze fair and unfair competition ● Explain the ways of effective competition ● Introduce Break even Analysis ● Explain Break even point ● Give an idea about break even chart ● Describe assumptions and uses of break even chart UNIT-2-Pricing Policies ● Explain the importance of pricing policies its objectives and factors affecting it ● Explain various methods and strategies of pricing policies- Going rate pricing, Skimming and Penetration Pricing ● What is multi stage pricing and peak load pricing ● Explain rate of return pricing UNIT-3-Price differentiation ● Explain price differentiation ● How price differentiation becomes beneficial ● Explain various types of price differentiation ● Differentiate between producers discount and quantitative discount ● Describe postage stamp pricing and dual pricing UNIT-4-Capital Budgeting ● Explain the meaning of capital budgeting ● Describe nature of capital budgeting with reference to demand of capital, supply of capital and capital rationing ● Describe methods of capital budgeting

			● Describe payback method and net present value method ● Differentiate between average rate of return method and internal rate of return method
		Statistics for Business Decisions	Unit 1 : Statistical Decision Theory ● Explain the meaning and scope of statistical decision theory. ● Explain the essential steps for decision making. ● Explain the important components of decision theory. ● Take decision using different methods (without using probability) like Maxi-max principle, Mini-max principle, Harwicz principle, Laplace principle and Maxi-min regret principle. ● Calculate the expected monitory value and expected opportunity loss, expected value of perfect information for decision making in the financial management. Unit 2 : Statistical Quality Control (SQC) ● Explain the meaning and advantages of SQC. ● Identify the causes of variation in the production process. ● Explain the types of variation in production process. ● Explain the types of control charts. ● Identify the production process under control using variable charts i.e. mean chart and range chart. ● Identify the production process under control using attribute charts i.e. *p*, *np* and *c* chart. Unit 3 : Business Forecasting ● Explain the meaning of Business Forecasting. ● Explain the utility of Business Forecasting. ● Calculate the trend value of data set using Moving Average method. ● Forecast the business related value on the basis of business related data set using Least Square Method (Linear Equation and Quadratic Equation). ● Forecast the business related value on the basis of business related data set using Exponential Smoothing Method. Unit 4 : Sampling and Estimation Theory ● Introduction ● Basic statistical law ● Methods of Sampling ● Advantages of Sampling

			● Sampling distribution ● Central Limit Theorem ● Theory of Estimation 1. Types of Estimates 2. Properties of Good Estimator ● Standard Error of Mean ● Estimation of the Population Mean ● Standard Error of Population Proportion ● Sample Size
		Marketing Management	Unit –1: Product Decisions ● Create the ability to communicate the marketing mixes and selling propositions for specific product offering. ● Define the concept of product and its dimensions. ● Explain product mix and the marketing strategies related to product mix. ● Define product line and the marketing strategies related to product mix. ● Elucidate the new product development process. ● Enumerate the reasons for the failure of new products. ● What is Product Life Cycle? And the involvement of a marketer at each stage of the life cycle. ● Elaborate the consumer adoption process and the marketing implications at each stage. Unit – 2: Pricing Decisions ● Define the concept of price. ● Define the concept of pricing. ● Elaborate the price setting process. ● Explain the different factors affecting the pricing decisions. ● Explain the some forms of pricing policies prominent to marketers. Unit – 3: Place (Distribution) Decisions ● Explain the key points of decision while planning the physical distribution of products. ● Enumerate the different services provided by the distribution channel members. ● Factors affecting the channel design decisions. ● Define how channel conflicts can be handled. ● Give a primary idea of the functioning of online portals and payment gateways.

			● Build the ability to develop marketing strategies based on product, price, place and promotions. Unit – 4: Promotion Decisions ● To develop among students the habit to observe marketing activities happening around them. ● Conceptualise marketing promotions and the role played by promotions in the marketing communication process. ● Explain the elements of the marketing promotion mix. ● Enumerate the different factors affecting the marketing promotion mix. ● To develop the ability to formulate marketing strategies that incorporate physiological and sociological factors which influence customers.
		Organizati on Behaviour	Unit 1: Introduction to Organizational Behaviour A student should be able to learn and understand about ● Meaning and nature of organizational behavior ● Evaluate the importance of organizational behavior ● Discuss shortcomings of the study of organizational behaviour ● Identify the contributing disciplines to organizational behavior ● Discuss concept and components of international OB ● Understanding the concept of positive organizational behavior (POB)and its key ● components like Optimism , resiliency, hope , emotional intelligence, self efficacy, ● happiness ● Defining each components of POB: Optimism , resiliency, hope , emotional ● intelligence, self efficacy, happiness Unit 2: Understanding Individual Behaviour A student should be able to learn and understand about ● Concept of individual behavior ● Explain the components of individual behavior ● Understanding the Concept of individual behavior and its components ● Defining the terms: perception, learning, values, attitudes, personality ● Describing the characteristics of perception ● Illustrating and explaining perceptual process ● Understanding the concept of perpetual selectivity and factors affecting it

			● Define the term learning and the nature of learning ● Elaborate the principles of learning ● Define the term personality and the characteristics of personality ● What are the determinants of personality ● Classify the types of personalities Unit 3: Dynamics of Groups and Teams A student should be able to learn and understand about ● What is a group and the various types of groups in an organization ● Discuss the various stages of group formation ● Explain the term group dynamics and reasons as to why people join groups ● Discuss the various steps in the formation of a group ● Justify factors affecting group dynamics ● What is a team and the difference between a group and team UNIT 4 – BASIC LEADERSHIP AND MOTIVATION THEORIES A student should be able to learn and understand about ● Understand and explain the concept of leadership, motivation, motivation process ● and evolution of Motivation and leadership theories ● Critically evaluate and illustrating Maslow's need hierarchy ● Present a contrast between Theory X and Theory Y ● Describe Adam's Equity Theory giving example ● Elucidate Traits theory, Fielders' Contingency Theory; Managerial Grid ● Understand the concept of transactional, transformational and charismatic leadership ● Identify and differentiate the characteristics of transformational leadership and ● charismatic leadership
		Corporate Finance	Unit 1: Long Term Investment Decisions ● Explain meaning and importance of capital budgeting decision ● Enumerate and explain stages of capital budgeting process ● Compare and contrast different investment appraisal methods ● Calculate ARR, PB, NPV, IRR, and PIfor an investment proposal ● Interpret ARR, PB, NPV, IRR and PI of a project Unit 2: Working Capital Management ● Clarify meaning and characteristics of working capital

			● Discuss the need of working capital in a business firm ● Describe concepts of working capital ● Explain factors affecting working capital requirement of a firm ● Explain in brief about Inventory Management, Cash Management and Receivables Management Unit 3: Inventory, Cash and Receivables Management ● Clarify the concept of inventory management its significance ● Write down the techniques of inventory management and apply them to practical situations ● Explain the meaning of receivables management its importance ● Elucidate elements of receivables management ● Describe the concept of cash management and its significance ● Prepare cash budget and interpret the outcome for taking financial decisions ● Discuss practical application of cash management Unit 4: Dividend Decisions ● Discuss meaning and types of dividend ● Elucidate determinants of dividend policy of a firm ● Compare and contrast different dividend policies ● Explain optimum dividend policy
	5	Business Environment	Unit – 1: An Introduction to Business Environment ● Describe the concept of business, environment and business environment ● Discuss the nature and importance of business environment ● Explain various factors affecting business internal environment ● Explain various factors affecting business external environment ● Describe the micro and macro factors affecting business environment Unit – 2: LPG ● Describe the measures implied in privatization in public enterprises ● Understand the probable benefits of privatization ● Compare public offer method of disinvestment with that of strategic sales ● State the arguments in favour and against privatization ● Discuss steps and effects towards globalization in Indian economy Unit – 3: Public Finance ● Compare public finance with private finance ● Discuss the meaning, objectives and instruments of fiscal policy

			● Describe the meaning, components and types of government budgets ● Explain the concept of deficit as depicted in government budget in India. ● Clarify the meaning of budgetary deficit and deficit financing ● Examine the effects of deficit financing in India. Unit – 4: International Institutions ● Explain the objectives and functions of World Bank ● Discuss the achievement and failures of World Bank ● Discuss the objectives, achievement and failures of IMF ● Discuss role of WTO in growth of world trade Discuss the membership, governance and institutions of European Union
		Production & Operation Management	Unit 1: Introduction to Production and Operations Management ● Discuss and differentiate concept of production management and operations management ● Explain the objectives of operations management. ● Discuss the major decision areas of operations management ● Differentiate service operations and manufacturing operations ● Identify and examine recent trends in operations management Unit 2: Process Selection ● Give a brief idea about major process decisions ● State factors that need to be taken into consideration for selection of a process ● Discuss the various types of production systems ● Elucidate characteristics, advantages and disadvantages of job shop process ● Discuss the term batch process and describe its advantages as well as disadvantages ● Give the meaning of continuous production process along with merits and demerits ● Clarify the concept of assembly process and state its merits and demerits ● Explain project process and mention its advantages and limitations Unit 3: Aggregate Planning and Maintenance Management ● Define aggregate planning ● Discuss importance of aggregate planning ● Clarify approach to aggregate planning ● Define the terms Capacity Planning and Capacity Requirement Planning ● Explain concept and importance of plant maintenance ● Classify types of plane maintenance

			Unit 4: Facility Location and Facility Layout ● Write down steps in location selection ● State factors affecting selection of region, community and site ● Critically evaluate urban, rural and sub urban sites ● Define the term plant layout ● Examine factors affecting plant layout decision ● State objectives of a good plant layout ● Classify types of plant layout ● Compare and contrast product layout and process layout ● Discuss concepts of static, cellular and combined layouts
		Direct Taxes	Unit I: Introduction to Income Tax act and basic concepts of Residential Status ● Explain Indian income tax system in detail with its history and foundation since 1961. ● Give explanation of terminologies used in Taxation in India. ● Explain briefly concept of Residential Status of a person in India in context to calculation of Tax. ● Explain basic methods of calculation of residential status with its practical applications. Unit II : Income from Salary ● Calculate Gross Salary of an employee. ● Calculate Taxable Salary with the deductions available from allowance and perquisites. Unit III: Income from House Property ● Calculate Gross annual value of the house property. ● Calculate Net annual value of the house property ● Calculate taxable income from house properties when more than one house is owned by the employer. Unit IV : Income from Business and Profession ● Calculate taxable income from Business after complying necessary legal provisions. ● Calculate taxable income from Profession after complying necessary legal provisions.
		Cost & Management Accounting	Unit 1 - Process Costing ● Explain Meaning and Features of Process Costing ● Calculate Process Loss and Wastage-Joint-Products and By-Products ● Calculate Practical Questions of process costing Unit 2 - Budgetary control

			● Explain meaning and types of budget. ● Significance of budget and its centers. ● Preparation of cash and flexible budget Unit 3 Standard Costing ● Explain the Meaning of Standard costing ● Distinguish between standard and actual costing ● Solve Practical problems of standard costing ● Understand Standard Cost and Estimated Cost for manufacturing unit. ● Explain Cost Controlling and measurement of impact of cost variances. ● Understand the variations in cost of product due to variation in material prices and ● quantities. ● Solve Practical problems of standard costing with reference to labour ● Find reasons of variances in cost of production with reference to labour and make ● decisions for cost control. Unit 4:- Activity based costing ● Meaning of activity based costing. ● Explain ABB and Traditional Budgeting. ● Explain Process and Benefits of ABB ● Zero Base Budgeting – Meaning, Advantages and Limitations
		Investment Banking and Financial Services	Unit – 1: Introduction ● Describe and discuss the concept of Indian Financial System ● Describe investment banking and how it is one of the important financial services in India ● Discuss various functions of merchant banking ● Explain role, responsibilities and duties of merchant banker ● Describe SEBI guidelines for investment/merchant banking ● Elucidate recent developments and challenges of merchant banking Unit – 2: Issue Management ● Clarify the term Public Issue and explain stages of public issue process ● Explain the concept of promoters' contribution ● State stages of Book Building Process ● Explain the concept of Green Shoe Option ● Discuss the process of Right Issue and aspects related to right issue

			● Explain the concept of Private Placement ● Give a brief idea about post issue work and obligations ● Elucidate role and responsibilities of broker, sub broker and underwriters Unit – 3: Leasing and Hire Purchase: ● Describe what is leasing and its use in commercial world ● Differentiate between various types of lease and its application ● Discuss pros and cons of leasing ● Compute and determine lease rent ● Evaluate financial lease problems from lessee's perspective ● Describe what is hire-purchase and its use in commercial world ● Differentiate between hire-purchase and leasing Unit – 4: Venture Capital and Credit Rating ● Define the terms venture capital and credit rating ● Discuss the types and application of credit rating ● Discuss merits and limitations of credit rating ● Explain about various credit rating agencies ● Describe the history and evolution of venture capital ● State the stages of venture investment process and explain them ● Identify various steps in venture financing ● Discuss about VC scenario in India
		Management of Industrial Relations	Unit 1: Basic framework of Industrial relations: ● Define the Concept of Industrial relations ● Identify the characteristics of IR ● Explain the objectives and importance of IR ● Elaborate the factors affecting industrial relations, ● Describe the Parties involved in industrial relations- workers employers and ● government, trade unions and the role played by them ● Enumerate the various approaches to industrial relations ● Correlate Globalization and industrial relation ● Identify and suggest measures to improve Industrial Relations in India Unit 2: Industrial Disputes in India ● Define the term industrial dispute and industrial conflict and distinguish between

			● them ● Classify the various types and reasons of industrial disputes ● Critically evaluate the impact of industrial disputes ● Discuss various preventive , voluntary and statutory measures to resolve industrial ● disputes ● Elucidate the provisions of industrial disputes Act, 1947 ● Differentiate between Human Relations and Industrial Relations Unit 3: Worker's Participation in Management ● Define the term WPM ● Explain the Origin of WPM ● Discuss the nature and objectives of WPM ● Classify various forms of Worker's Participation in Management ● Discuss the role Works Committee , Joint management Councils, Joint councils, ● board level participation ● Describe the concept and working of Quality circles ● Explain the concept of Employee Empowerment and its techniques Unit 4: Trade Unionism, Collective Bargaining and Negotiation ● Define the term trade union , negotiation and collective bargaining ● Discuss the functions of trade unions ● Enumerate the types of trade unions ● Identify the reasons for slow growth of trade unions in India ● Describe the evolution of trade union movement in India ● Evaluate the problems of trade unions in India ● Enlist the principles of Collective bargaining ● Label and explain the different forms of collective bargaining ● Discuss the principles of effective negotiation ● Describe the current trends, issues and practices in Negotiation in Indian Industries.
		Direct Taxes & GST	Unit I: Income from Capital Gain ● Calculate taxable income from Capital Gain arising after transfer of Assets. ● Explain different types of capital assets in detail. ● Calculate taxable income from other sources. Unit II: income from Other Sources

			● Calculate taxable income from other sources. Unit III : Deductions from incomes ● Explain deductions available from total income as per Income Tax Act, 1961. ● Give explanation of maximum possible deductions under different sections as per Income tax Act, 1961. Unit IV: GST ● Describe history of GST ● GST registration ● Advantages of GST ● Types of GST
		Financial Institutions & Markets	Unit – 1: Money Market: ● Discuss the concept and working of Indian Financial System ● Discuss role of money market in financial system ● Explain various instruments of money market ● Discuss working of various institutions participating in money market ● Describe various reforms/measures taken to strengthen the money market. Unit – 2: Capital Market ● Define the term capital market ● Discuss structure of capital market ● State role and importance of capital market ● Describe evolution/growth of capital market ● Identify factors affecting the growth of capital market ● Examine problems of capital market in India Unit – 3: Reserve Bank of India ● Discuss concept and importance of Central Bank ● Discuss establishment and management of Reserve Bank of India ● Explain functions of Reserve Bank of India ● Discuss the concept and importance of monetary policy ● Explain the operations of various tools of monetary policy Unit – 4: Institutional Financing ● Classify financial institutions ● Differentiate all India development institutions and specialized financial institutions

			● Describe history, objectives, functions and modus operandi of various all India development institutions, viz. IFC, IDBI, SIDBI and ICICI ● Examine history, objectives, functions and modus operandi of specialized financial institutions, viz. EXIM Bank, TFCI and IDFC
		Accounting for Managerial Decisions	Unit 1 Marginal Costing & Unit 2 Decision Making ● Explain Meaning, significance, Assumptions-Characteristics of Marginal Costing ● Discuss Advantages of Marginal Costing, Limitations of Marginal Costing, Break –Even Analysis: ● Calculate Contribution, P/V Ratio, Breakeven point, Margin of safety ● Discuss Marginal Costing as a Tool for Decision Making ● Calculate Key Factor [Material & Labour only] ● Explain decision making process ● Explain decisions like Adding or discontinuing product, Make or buy decision, Selling or further processing, Selling in foreign market Unit 3 Cash Flow Statement ● Explain Introduction & Meaning of terms 'cash" cash flow'-' cash flow statement' as per AS- 3 ● Discuss Classification of cash flow ● Procedure for preparations, Limitations of cash flow statement and fund flow statement ● Explain Importance and Managerial Utility of cash flow statement ● Prepare Cash flow statemen Unit 4 Responsibility Accounting. ● Explain Introduction & Meaning and significance of Responsibility accounting ● Explain Organization structure of Responsibility accounting, Limitations of Responsibility accounting ● Identify Different centers like cost center, profit center.
		Contemporary Issues in Investment	Unit – 1: Introduction to the Landscape of Investment ● Define the term Investment ● Classify various investment alternatives ● Explain innovative investment products ● State the stages of process of investment trading and margin trading ● Construct various indices, viz. sensex and nifty ● Discuss the concepts of real return and nominal return

			● Measure return and risk – historical and expected ● Enumerate sources of risk Unit – 2: Mutual Funds ● Clarify the concept of mutual fund ● Explain the organization structure of mutual fund ● Discuss about origin and growth of mutual fund in India ● Elucidate benefits of mutual fund ● Clarify the concepts: Net Asset Value, Expense Ratio, Entry and Exit Load, AUM ● Classify mutual funds ● Explain the role of AMFI Unit – 3: Stock Market Operations ● Narrate trading system in securities exchange ● Describe screen based trading system ● Give a brief idea about NEAT and BOLT ● Elaborate on market phases ● Explain the mechanism of order management and trade management in stock market ● Provide a brief explanation on market window operations and auction ● Define and differentiate long and short trading strategies ● Explain about settlement and market margins Unit – 4: Insurance ● Clarify role and principles of insurance ● Describe history of insurance in India ● Explain about Nationalization and Liberalization of insurance in India ● Discuss the role of IRDA ● Describe advantages of life insurance ● Classify life insurance policies in India
		Performance and Compensation Management	Unit 1 ● Apprehend and Define the term performance management ● Justify the Philosophy of Performance Management ● Explain the Objectives of Performance Management System ● Distinguish between Performance appraisal and Performance Management ● Elaborate the Performance Management Process

			● Write a note on Performance Planning ● Explain the Process and Documentation of Performance Appraisal ● Describe the process and objective of Appraisal Interview ● Identify the aspects and importance Performance Feedback and Counselling ● Elaborate the steps in a performance management system Unit 2 ● Describe the concept of Performance management and reward systems. ● Define and classify various Performance Indicators ● Discuss the role of Performance Coaching , Mentoring and Counselling ● Distinguish between coaching, mentoring and counselling ● Comprehend the term Competency development ● Develop systems to incorporate competency development ● Ascertain the use of technology in PMS ● Explain the term e-PMS as against web based PMS ● Identify and discuss the ethical Perspectives in performance appraisal Unit 3 ● Define incentives and benefits ● Differentiate between them ● Classify Incentives plans for production employees and for other professionals ● Explain the essential guidelines for developing effective incentive plan ● Explain the concept of Pay for performance ● Categorise and explain various types of Supplementary pay benefits into Insurance ● benefits, retirement benefits, employee services benefits. ● Detect the different basis for classifying benefits ● Identify the factors considered while choosing benefits ● Elucidate the steps in administration of benefits ● Explain concept of flexible benefit plans and ESOPs ● Discuss various types of ESOP schemes Unit 4 ● Define the concept of Minimum wage, fair wage and living wage. ● Distinguish between Minimum wage, fair wage and living wage. ● Enumerate the legal provisions of The Minimum Wages Act 1948

			● Discuss the provisions of Payment of Wages Act 1932 ● Describe the methods of state regulation of wages. ● Identify the basis for Wage differentials ● Introduce the concept of national wage policy ● Explain the role Wage boards in wage determination and negotiation