GALGOTIAS UNIVERSITY

SCHOOL OF BASIC AND APPLIED SCIENCES

Division of Mathematics, SBAS

Analysis:

Elementary set theory, finite, countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. Sequences and series, convergence, limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem. Continuity, uniform continuity, differentiability, mean value theorem. Sequences and series of functions, uniform convergence. Riemann sums and Riemann integral, Improper Integrals. Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue measure, Lebesgue integral. Functions of several variables, directional derivative, partial derivative, derivative as a linear transformation, inverse and implicit function theorems. Metric spaces, compactness, connectedness. Normed linear Spaces. Spaces of continuous functions as examples.

Linear Algebra:

Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations.

Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem. Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms. Inner product spaces, orthonormal basis. Quadratic forms, reduction and classification of quadratic forms

Complex Analysis:

Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations.Contour integral, Cauchy's theorem, Cauchy's integral formula, Liouville's theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem.

Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.

Algebra:

Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle, derangements. Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder Theorem, Euler's Ø- function, primitive roots. Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayley's theorem, class equations, Sylow theorems. Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain.Polynomial rings and irreducibility criteria.Fields, finite fields, field extensions, Galois Theory.

Topology:

Basis, dense sets, subspace and product topology, separation axioms, connectedness and compactness.

Ordinary Differential Equations (ODEs):

Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs.General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Green's function.

Partial Differential Equations (PDEs):

Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs. Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.

Numerical Analysis :

Numerical solutions of algebraic equations, Method of iteration and Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numericaldifferentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler andRunge-Kutta methods.

Calculus of Variations:

Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations.

Linear Integral Equations:

Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.

Classical Mechanics:

Generalized coordinates, Lagrange's equations, Hamilton's canonical equations, Hamilton's principle and principle of least action, Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

Operations Research:

Linear programming problem, simplex methods, duality. Elementary queuing and inventory models. Steady-state solutions of Markovian queuing models: M/M/1, M/M/1 with limited waiting space,

M/M/C, M/M/C with limited waiting space, M/G/1.

Statistics:

Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate); expectation and moments. Independent random variables, marginal and conditional distributions. Characteristic functions. Probability inequalities (Tchebyshef, Markov, Jensen). Modes of convergence, weak and strong laws of large numbers, Central Limit theorems (i.i.d. case). Markov chains with finite and countable state space, classification of states, limiting behaviour of n-step transition probabilities, stationary distribution, Poisson and birth-and-death processes. Standard discrete and continuous univariate distributions. samplingdistributions, standard errors and asymptotic distributions, distribution of order statistics and range. Methods of estimation, properties of estimators, confidence intervals. Tests of hypotheses: most powerful and uniformly most powerful tests, likelihood ratio tests. Analysis of discrete data and chi-square test of goodness of fit. Large sample tests. Simple nonparametric tests for one and two sample problems, rank correlation and test for independence. Elementary Bayesian inference.

SCHOOL OF BASIC AND APPLIED SCIENCES

Department of Physics

Definitions and types of matrices; Solution of linear algebraic equations; Characteristic equation, Diagonal form; Eigen values and Eigen vectors; Cayley - Hamilton theorem; Functions of matrices; Application in solving linear differential equation.Function of complex variables; Cauchy-Riemann differential equations; Cauchy's integral theorem, Cauchy's integral formula; Taylor's Series, Laurent series; Cauchy residue theorem; Singular points of an analytical function; Evaluation of residues & definite integrals.Dirac delta function, Delta sequences for one dimensional function, Properties of delta function; Gamma function, factorial notation and applications; Beta function.Partial differential equations in theoretical physics, Boundary value problems, Neumann &Dirichlet Boundary conditions, Separation of variables, Singular points, Series solutions.Introduction to probability theory, Random variables, Binomial, Poisson and Normal distribution.D'Alembert's principle; Lagrange's equations; Velocity-dependent potentials; Simple applications of the Lagrangian formulation; Hamilton's principle; Derivation of Lagrange's equations from Hamilton's principle; Lagrange Multipliers and constraint optimization Problems. Conservation theorems and symmetry properties, Energy Function and the conservation of energy; Two-Body Central Force Problem, Reduction to the equivalent one body problem; Equations of motion and first integrals; Equivalent one-dimensional problem and classification of orbits; Differential equation for the orbit and integrable power-law potentials; Kepler problem, Inverse square law of force; Scattering in a central force field, Transformation of the scattering problem to laboratory coordinates. Small Oscillations, Formulation of the problem, The eigenvalue equation and the principal axis transformation; Frequencies of free vibration and normal coordinates; Legendre transformations and the Hamilton equations of motion, Derivation of Hamilton's equations from a variational principle.

Postulates of QM; Observables and operators, measurements; the state function and expectation values; the time-dependent Schrodinger equation; time development of state functions; solution to the initial value problem. Dirac notation; superposition principle; commutator relations; their connection to the uncertainty principle; complete sets of commuting observables; Time development of state functions and expectation values; parity. Hilbert space; Hermitian operators and their properties; Matrix mechanics, Basis and representations, matrix properties; Unitary and similarity transformations; the energy representation. General properties of one-dimensional Schrodinger equation; Finite potential well, Harmonic oscillator; Unbound states; barrier problems. Ladder operators; eigen values and eigen functions of L^2 and L_z using spherical harmonics Radial equation for a spherically symmetric central potential; Hydrogen atom, Eigenvalues and radial eigenfunctions, degeneracy, probability distribution, angular momentum and rotations. Total angular momentum J; eigenvalues of J^2 and J_z; Addition of angular momentum; coupled and uncoupled representation of eigen functions, Clebsch Gordon coefficients for $j_1=j_2=1/2$ and $j_1= 1$, $j_2 =1/2$, Angular momentum matrices; Pauli spin matrices; spin eigen functions

Kirchoff's laws; Thevenin& Norton theorems; Superposition; Reciprocity; Compensation theorems; Source transformation; Delta and Star transformations; Laplace Transformation; Convolution integral. PN Junction, contact potential and Space Charge phenomena, I-V relationships, biasing of PN Junctions, characteristics of crystal and

ideal diode, Limitations in the Operating Conditions of *p-n* Junction, Breakdown phenomena- avalanche and Zener processes.Zener diode, Zener regulated power supply, Rectification- Half wave, Full wave, Centre-Tap Full-Wave and Bridge rectifier, Diode as a circuit element: Filter Circuits, clipping, clamping with first and second approximation, Voltage-Multiplier Circuits. Low frequency and high frequency and Power amplifiers using transistors (Class A, B and C); Sine wave generators, Negative feedback: Emitter follower, Darlington Amplifier, Switching Transistors: Multi-vibrator circuits (Astable, monostable and Bistable); Differentiating and integrating circuit (Triangle and square wave generation) Ideal operational amplifier: Characteristics; Feedback types; Applications: Basic scaling circuits, current to voltage and voltage to current conversion; Sum and difference amplifiers; Integrating and differentiating circuits; R.C. Amplifiers; Filters.

Concept of phase space; Statistical definition of entropy; Gibb's paradox; Ensembles: microcanonical, canonical and grand canonical; partition function and derivation of thermodynamics; Entropy as an ensemble average; Classical ideal gas.Density operator; Liouville theorem, Quantum microcanonical, Canonical and grand canonical ensembles; Specific heat of solids (Einstein and Debye theory), Distribution function (MB, FD and B-E), Ideal Fermi gas, Fermi-Dirac statistics.Bose-Einstein statistics; Applications of the formalism to Ideal Bose gas; properties of black-body radiation, Bose-Einstein condensation, Examples of BEC, BEC in a harmonic potential.Brownian motion: as a random walk (Einstein theory), as a diffusion process; Langevin theory of Brownian motion; Fluctuation-dissipation theoremLandau theory of phase transition, Paramagnetism, Ferromagnetism, Ising model in 2-Dimension, Curie temperature.

Lorentz transformation as orthogonal transformation in 4- dimension, Relativistic equation of motion, Applications of energy momentum conservation, Disintegration of a particle, C.M. System and reaction thresholds.Four vectors in Electrodynamics, 4-current density, 4-potential, Covariant continuity equation, Wave equation, Covariance of Maxwell equations, Electromagnetic field tensor, Transformation of EM fields, Invariants of the EM fields, Energy momentum tensor of the EM fields and the conservation laws. Lienard-Wiechert Potentials, Field of a charge in arbitrary motion and uniform motion, Radiated power from an accelerated charge at low velocities.Radiation from a charged particle with collinear velocity and acceleration.Radiation from a charged particle in a circular orbit, Radiation from an ultra-relativistic particle, Radiation reaction.Rayleigh scattering, absorption of radiation by bound electron.

Hydrogen atom spectrum; Electron spin; Spin Orbit interaction; Lande interval rule; Two electron systems; LS – JJ coupling Schemes; Fine structure; Spectroscopic terms and selection rules; Hyperfine structure; Exchange symmetry of wave function; Pauli's exclusion principle; Spectrum of Helium and Alkali atom.Zeeman and Paschen Back Effect of one and two electron systems; Stark effect; X-ray – Auger transitions; Compton Effect; NMR – Basic principles; Classical and Quantum mechanical description; Magnetic dipole coupling; Chemical shift; ESR – Basic principles; Nuclear interaction and Hyperfine Structure.Rotational spectra of diatomic molecules; Rotation spectra of polyatomic molecules; Linear, symmetric top and asymmetric top molecules; Experimental Techniques; Diatomic vibrating rotator; Linear, Symmetric top molecule; Analysis by infrared techniques.Raman Effect; Quantum theory of Raman effect; Electronic, rotational, vibrational and Raman spectra of diatomic molecules; Raman spectra of polyatomic molecules (tentative); Experimental techniques.Electronic spectra of diatomic

molecules; Frank-Condon principle; Dissociation energy and dissociation products; Rotational fine structure of electronic vibration transitions.

Basic nuclear properties; Size, Shape and charge distribution; Spin and parity; Binding energy, liquid drop model and semi-empirical mass formula, nature of the nuclear force form of nucleon-nucleon potential; Charge independence and charge-symmetry of nuclear forces; Deuteron problem.Basic properties of nuclear shell model, Evidence of shell structure; Single-particle shell model, its validity and limitations; Rotational spectra; Magnetic moments and Schmidt lines; Iso-spins. Decay-range; Particle spectra; Gamow theory; Beta decay; Fermi decay of beta decay; Shape of the beta spectrum; Total decay rate; Angular momentum and parity selection rules; Parity violation; Detection and properties of neutrino; Angular momentum and parity selection rules; Internal conversion; Nuclear isomerism.Reaction dynamics; The Q equation; Theory of Nuclear reaction; Partial wave analysis; Compound nucleus formations and break up; Resonance scattering and reactions; Theory of stripping reactions; The Fission process; Neutron released in the fission process; Fusion process. Types of interaction between elementary particles; Hadrons and leptons; Symmetry and conservation laws; Elementary ideas of CP and CPT invariance; Classification of hadrons quark model SU(2) SU(3) multiplets; Gell-Mann-Okubo mass formula for octet decuplet hadrons.Introduction to scattering, spin dependence of the interaction: singlet and triplet scattering lengths; coherent scattering from ortho and para-hydrogen; singlet state of the deutron; np, pp, nn scattering; exchange forces and saturation.Residual interaction single particle model and individual particle model; justification of Nordheims rule; configuration mixing; anti-symmetrization of wave functions two and three nucleons in unfilled shell; coefficients of fractional parentage; Pairing interaction and its effects.

Energy band formation, Kronig-Penny model-allowed and forbidden energy band-E-k diagram, one dimensional Brillouin zone, effective mass, direct and indirect band gap, electrons and holes, intrinsic and extrinsic semiconductors, elemental and compound semiconductor, generation, recombination and injection of carriers, basic governing equations in semiconductors-Poisson's equation, continuity equation.Carrier concentration and Fermi level of intrinsic and extrinsic semiconductor, Thermal Effect, conductivity and carrier mobility in semiconductor, Drift and diffusion of carriers, Carrier scattering-Ionized Impurity and Phonon Scattering, Hall effect in semiconductor and its application.The P-N junction formation mechanism, built in potential, Space Charge phenomena, biased pn junction, Boltzmann's Approximation: Density of carriers injected to the limits of depletion layer, Minority currents in neutral region, Junction breakdown: avalanche and zener processes, Junction capacitance.Bipolar junction transistor (BJT), definition of h-parameters and applications, Field Effect Transistors (FET), MOSFET and applications.Introduction to Schottky diodes, Full depletion analysis,
Introduction to high frequency diodes: Gunn diode, Trapatt diode and Impatt diode.

Feedback concepts, Oscillatory Circuit, Colpitt's oscillator, Hartley oscillator, Phase shift oscillator, Wien Bridge oscillator, Limitations of LC and RC Oscillators: Crystal oscillator, negative resistance oscillator: tunnel diode oscillator, Unijunction Oscillator.Digital systems-Boolean algebra and Logic gates, Gate level minimization, K - Map , Combinational Logics- Half adder-sub-tractor (half & full) Comparators; Encoder-Decoders; Multiplexers; De-multiplexers; decimal adders and Subtractors.
Sequential circuits, Latches, Flip-flops triggering of flip-flop – D and T type flip-flops - asynchronous,

synchronous, Registers , decade and modulo – N counters.Analog Switches, High speed sample- and- hold Circuits, Types of D/A Converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.Introduction to 8085, basic concepts of microprocessors CPU, I/O devices, clock, memory, bussed architecture, tristate logic, address bus, data bus and control bus, microprocessor architecture: intel 8085A microprocessor, pin description and internal architecture.Introduction to display devices: Electro Luminescence display, Plasma display, Liquid Crystal Display (LCD), LED Display, Organic Light Emitting Devices (OLED), Elements of measuring instruments – capacitive transducer – inductive transducer- electrical strain gauges –resistance thermometer –piezoelectric and photoelectric transducers.

Phase Diagram - Basic principle - Simple binary systems - Solid solutions - Eutectic systems - Application. Solid Solution - Interstitial and substitutional solid solutions - Super lattices - Intermediate and interstitial phases - Intermetallic compounds, Elementary ideas of corrosion - Oxidation - Creep and fracture. Liquid crustal ordering, Phases of liquid crystal, Landau-De Gennes theory of nematic liquid crystals.Point defects - Schottky and Frenkel defects - number of defects as a function of temperature - Diffusion in metals - Diffusion and ionic conductivity in inonic crystals - Dislocations - Edge and screw dislocations - Motion of dislocations under uniform shear stress - Stress fields around dislocations - Effect of grain size on dislocation. Internal electric field in a dielectric - Clausius - Mossotti and Lorentz - Lorenz equations - Dielectric dispersion and loss, Ferroelectrics - Ferro electricity - General properties - Dipole theory - Ionic displacements and the behaviors of $BaTiO_3$ - Spontaneous polarization of $BaTiO_3$ - Thermodynamics of Ferro electric transitions.Atomic model of elastic behaviour - Elastic deformation - Relaxation process - Model for viscoelastic behavior, Polymerization mechanism - Polymer structures - Deformation of polymers - Effect of structure on the behaviour of ceramic phases - composites.Super conductivity – –Meissner effect – Type I and II superconductors – thermal properties of superconductors – High frequency phenomenological properties – coherence length – London model –Ginzburg-Landau theory – flux quantisation – BCS theory – Josephson effect (AC and DC) – High temperature superconducting oxides – Technological applications

Crystal Diffraction Methods for X rays, Laue, Rotating Crystal, Powder Method; Reciprocal Lattice and Brillouin Zones; Reciprocal Lattice to sc, bcc, fcc.; Scattered wave amplitude; Fourier analysis of the basis; Structure Factor of lattices (sc, bcc, fcc); Atomic Form Factor.Electrons in periodic potential, Band Theory, Tight Binding, Cellular and Pseudo potential methods, Symmetry of energy bands, density of states, Fermi surface, De Haas von Alfen effect, Elementary ideas of quantum Hall effect.Vibrations of Monoatomic Lattice, normal mode frequencies, dispersion relation; Lattice with two atoms per unit cell; normal mode frequencies, dispersion relation: Quantization of lattice vibrations, phonon momentum; Anharmonic Crystal Interaction; Thermal conductivity, Lattice Thermal Resistivity.Langevin diamagnetic equation; diamagnetic response; Quantum mechanical formulation; core diamagnetism; Quantum Theory of Paramagnetism; Crystal Field Splitting and Quenching of orbital angular momentum; Paramagnetic susceptibility of conduction electrons. Ferromagnetic order, Exchange Integral, Saturation magnetization; Magnons, neutron magnetic scattering; Spinels, Yttrium Iron Garnets; Anti Ferromagnetic order; Anisotropy energy, transition region between domains.

Text Books:

1. Arfken& Weber, Mathematical methods for physicists, 4th ed., Academic Press, San Diego, 1995.
2. H. Goldstein, Poole and Salko, Classical Mechanics, 3rd ed., Narosa Publication, New York,2001.
3. Simon, Classical Mechanics, 4th ed., Addison-Wesley, New York, 1977.
4. DJ Griffiths, Introduction to Quantum Mechanics,5th ,Pearson Prentice Hall, USA,1995.
5. Milman J. and Halkias C.C., Electronic Devices and Circuits, Tata McGraw Hill, 2nd Edition, New York, 1996.
6. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, RPearson/Prentice Hall, 9th Edition, Ohio, 2006.
7. Greiner, Neise and Stocker,Thermodynamics and Statistical Mechanics, Springer,Verlag, 1995.
8. RK Pathria and PD Beale, Statistical Mechanics, 3rd ed., Elsevier, 2011.
9. D.J. Griffiths, Introduction to Electrodynamics,4thed.,Pearson, USA, 2013.
10. Raj Kumar, Atomic and molecular spectra and laser, KedarNath Ram Nath Publications Meerut, 2012
11. Harvey Elliott White, Introduction to Atomic Spectra, McGraw Hill, 1963.
12. Arthur Beiser, Concepts of Modern Physics, 6thed.,McGraw Hill, New Delhi, 2008.
13. R.A. Gayakwad, Op- Amps. and Linear Integrated circuits, 3rd ed., Printice Hall, 1993.
14. Charles Kittel, Introduction to Solid State Physics, 7th edition, John Wiley & sons, USA,1996.
15. A J Dekker, Solid State Physics, Prentice-Hall, New York, 1957.
16. B.L. Cohen, Concepts of Nuclear Physics, McGraw Hill,USA, 1971.

SCHOOL OF BASIC AND APPLIED SCIENCES

CHEMISTRY

Physical Chemistry:

1. Basic principles and applications of quantum mechanics – hydrogen atom, angular momentum.
2. Variational and perturbational methods.
3. Basics of atomic structure, electronic configuration, shapes of orbitals, hydrogen atom spectra.
4. Theoretical treatment of atomic structures and chemical bonding.
5. Chemical applications of group theory.
6. Basic principles and application of spectroscopy – rotational, vibrational, electronic, Raman, ESR, NMR.
7. Chemical thermodynamics.
8. Phase equilibria.
9. Statistical thermodynamics.
10. Chemical equilibria.
11. Electrochemistry – Nernst equation, electrode kinetics, electrical double layer, Debye-Hückel theory.
12. Chemical kinetics – empirical rate laws, Arrhenius equation, theories of reaction rates, determination of reaction mechanisms, experimental techniques

for fast reactions.

13. Concepts of catalysis.
14. Polymer chemistry. Molecular weights and their determinations. Kinetics of chain polymerization.
15. Solids - structural classification of binary and ternary compounds, diffraction techniques, bonding, thermal, electrical and magnetic properties
16. Collids and surface phenomena.
17. Data analysis.

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules.
3. Concepts of acids and bases.
4. Chemistry of the main group elements and their compounds. Allotropy, synthesis, bonding and structure.
5. Chemistry of transition elements and coordination compounds – bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements – spectral and magnetic properties, analytical applications.
7. Organometallic compounds - synthesis, bonding and structure, and reactivity. Organometallics in homogenous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation techniques. Spectroscopic electro- and thermoanalytical methods.
10. Bioinorganic chemistry – photosystems, porphyrines, metalloenzymes, oxygen transport, electron- transfer reactions, nitrogen fixation.
11. Physical characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-, NQR, MS,

electron spectroscopy and microscopic techniques.

12. Nuclear chemistry – nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Organic Chemistry

1. IUPAC nomenclature of organic compounds.
2. Principles of stereochemistry, conformational analysis, isomerism and chirality.
3. Reactive intermediates and organic reaction mechanisms.
4. Concepts of aromaticity.
5. Pericyclic reactions.
6. Named reactions.
7. Transformations and rearrangements.
8. Principles and applications of organic photochemistry. Free radical reactions.
9. Reactions involving nucleophotic carbon intermediates.
10. Oxidation and reduction of functional groups.
11. Common reagents (organic, inorganic and organometallic) in organic synthesis.
12. Chemistry of natural products such as steroids, alkaloids, terpenes, peptides, carbohydrates, nucleic acids and lipids.
13. Selective organic transformations – chemoselectivity, regioselectivity, stereoselectivity, enantioselectivity. Protecting groups.
14. Chemistry of aromatic and aliphatic heterocyclic compounds.
15. Physical characterisation of organic compounds by IR, UV-, MS, and NMR.

Interdisciplinary topics

1. Chemistry in nanoscience and technology.
2. Catalysis and green chemistry.
3. Medicinal chemistry.
4. Supramolecular chemistry.
5. Environmental chemistry.

FORENSIC SCIENCE

Unit – I

Forensic Science: Definition, History & Development, Scope, Ethics in Forensic Science
Physical Evidence: Nature, Types, Search methods, Collection, Preservation, Packing & Forwarding of Physical & Trace evidence for forensic analyses, Chain of Custody
Crime Scene: Nature, Types, Preservation of Scene of Crime
Criminal Investigations: Unnatural deaths, Criminal assaults, Sexual offences, Poisoning, Vehicular accidents
Courts: Types, powers and jurisdiction, Admissibility of evidence in Courts, Definition of Experts, Provisions in Cr.P.C.,1973 & Indian Evidence Act relating to experts & their reports; Court Procedures pertaining to Expert Testimony & Witness
Organization of Forensic Science Laboratories of Centre and State, NCRB and NICFS
Fundamental Rights: Right of Equality (Articles 14 to 18) and Right of Freedom (Articles 19 to 22) as per Constitution of India
Criminal Profiling: Profile of victim and culprit, its role in crime investigation, Lie detection (Polygraphy), Narco analysis, Brain mapping, scope and limitations Concept of quality control management in Forensic institutions

Unit – II

Microscopy: Polarizing, Comparison, Stereoscopic, Fluorescent and Electron Microscopes
Spectrophotometry: UV, Visible, IR, Raman, Atomic absorption, Emission Neutron Activation Analysis X – rays and x-ray based techniques such as XRD, XRF Mass Spectroscopy
Chromatographic Techniques: TLC, GLC, HPLC,HPTLC
Hyphenated Techniques: GC-MS, LC-MS, IR-MS and ICP-MS
Electrophoresis: High and Low voltage electrophoresis, Immunoelectrophoresis
Immunoassays: Principle, Types ,Techniques and applications

Unit – III

Detection and Identification of Blood stains , Determination of Species of Origin ,Blood Group Systems ,Techniques of Determination of Blood groups of Blood Stains ,Detection of Seminal and other body fluids and their Blood Grouping, Red cells Enzymes, Serum Proteins of forensic significance, Disputed Paternity & Maternity

DNA: Structure, DNA as genetic marker, DNA Extraction and Profiling Techniques
DNA Phenotyping and RNA Profiling & their applications
Wild life Forensics: Wild life (Protection) Act,1972, Scope, Evidences and Identification

Unit – IV

Analysis of Ethyl alcohol in beverages , liquors, biological fluids and breath, Analysis of Methanol and Denaturants Illicit liquors, Analysis of Chemicals in Trap Cases
Metabolism and Chemical examination of : Insecticides & Pesticides, Tranquillizers & Sedatives, Hypnotics Stimulants, Narcotics, Opiates, Drugs of abuse; Analyses of above and their Toxicity, Plant poisons, Metallic Poisons, Extraction, Isolation & Clean-up procedures, Identification of common poisons from viscera, tissues and body fluids

Unit – V

Fire arms: Types, Classification, Ammunition and their Compositions, Forensic examination of Firearms, Ammunition, Firearms' projectiles (Bullets, Shots, Slug etc.), Shell case Gunshot residues analysis ,Concept of Velocity, Penetration, Dispersion, Ricochet, Accidental Discharge, Determination of Range in firearm cases
Examination of Country made firearms
Basics of Internal, External and Terminal Ballistics
Tool marks: Meaning, Types and Examination
Restoration of Erased Markings on Metal Surfaces

Unit – VI

Fire and Arson: Analyses of Petroleum Products and other incendiary materials
Explosives: Definition, Types and Analyses
Bombs: Country made bombs, Improvised Explosive Devices (IEDs) and their examination
Investigation in Explosion and Arson related cases
Photography: Types, application in criminal investigation & Forensic evidence examination

Unit – VII

Hair & Fibers: Nature, Types, Structure and Examination
Pollens and Diatoms: Their application in Forensic investigation
Dust & Soil: Nature, Types, Forensic Examination

Paint, Lacquer & Varnishes: Nature, composition and forensic examination
Glass: Composition, Types, Fractures, Examination
Cement, Mortar and Concrete: General Composition, Forensic Analysis
Computer Forensics: Introduction, Types of Computer crimes, Digital evidence- Seizure, Acquisition and Forensic examination
Mobile Phone Forensics

Unit – VIII

Fingerprints: History, Characteristics, Types, Classification, Preservation, Development, Lifting and Comparison, Examination of Chance Prints, Computerization of Fingerprints, AFIS
Track Marks: Foot Prints, Shoe Prints, Tire Marks, Their Preservation & Casting, Comparison, Skid marks. Gait pattern
Biometric Systems of Identification and its relevance
Voice Analysis: Introduction, Significance, Structure of Human Voice apparatus, Voice spectrography, Voice analysis, Legal aspects and limitations

Unit – IX

Documents: Definition, Types, Preliminary examination of documents
Reproduction of documents through photographic and mechanical means and their examination
Examination of Alterations such as Erasures, Obliterations & Additions
Indentations, Secret writings and Charred documents
Inks, Papers and their scientific examinations with modern methods
Age of documents
Examination of Typescripts, Printed matter including currency notes and lottery tickets. Mechanical impressions
Hand writings: Class and Individual characteristics of Handwritings, Factors affecting handwritings, Standard samples for comparison, Comparison of hand-written texts
Anonymous and disguised writings
Identification of hand writings, signatures, detection of forged signature and forgeries
Examination of Credit Cards and Similar materials

Unit –X

Modes & Manner of deaths, Sexual offences and its medicolegal importance, Amendments in law related to sexual offences
Post – mortem examination and Post – mortem changes, Estimation of time since death

Injuries & Wounds: Types, Medicolegal importance, Gunshot wounds

Determination of Species of Origin, Sex , Age, Stature, and individual identification through skeletal remains

Identification through Skull superimposition and facial reconstruction

Human dentition, Type of teeth, determination of Age, Bite marks

Forensic Entomology: Introduction, Insects of forensic importance, Insects on Carrion, Forensic applications

BIOCHEMISTRY

1. Biomolecules and their Interaction
2. Cell Biology
3. Molecular Biology
4. Immunology
5. Cell Communication and Cancer Biology
6. Plant Physiology
7. Animal Physiology
8. Inheritance Biology
9. Genetic Engineering
10. Biostatistics
11. Methods in Biology

1. MOLECULES AND THEIR INTERACTION RELAVENT TO BIOLOGY

Structure of atoms, molecules and chemical bonds.Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).

Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics,colligativeproperties).Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.

Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes. Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA). I. Stability of proteins and nucleic acids. J. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

2. Cell Biology

Membrane structure and function.Structural organization and function of intracellular organelles vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility).Organization of genes and chromosomes (Operon, unique and repetitive DNA, interrupted genes, gene families, structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons). Cell division and cell cycle. Microbial Physiology.

3. Molecular Biology

DNA replication in prokaryotes and eukaryotes, DNA repair and type of repair, SOS repair, RNA

synthesis and processing, Splicing.Protein synthesis and processing, genetic codeControl of gene expression at transcription and translation level.

4. Immunology

Innate and adaptive immune system. Innate and adaptive immunity, antigens, antigenicity and immunogenicity. B and T cell epitopes, structure and function of antibody molecules. Generation of antibody diversity, monoclonal antibodies, antigen-antibody interactions, MHC molecules, antigen processing and presentation, activation and differentiation of B and T cells, B and T cell receptors, humoral and cellmediated immune responses,the complement system, Toll-like receptors, cell-mediated effector functions, hypersensitivity and autoimmunity, immune response during bacterial (tuberculosis), Autoimmune diseases.

5. **Cell Communication and cancer biology**

Cell signaling Hormones and their receptors, cell surface receptor, signaling through G-protein coupled receptors, signal transduction pathways, second messengers,Cellular communication, general principles of cell communication, cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, neurotransmission and its regulation. Cancer Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

6.**Plant Physiology**

Photosynthesis: CO2 fixation-C3, C4 and CAM pathways. Respiration and photorespiration,Nitrogen metabolism. Plant hormones. Sensory photobiology: Structure, function and mechanisms of action of phytochromes,cryptochromes andphototropins; stomatal movement; photoperiodism and biological clocks.Solute transport and photoassimilate translocation – uptake, transport and translocation of water, ions, solutes and macromolecule, transpiration; mechanisms of loading and unloading of photoassimilates.

7. **ANIMAL PHYSIOLOGY**

Blood and circulation: Blood corpuscles, haemopoiesis, blood volume, blood volume regulation, blood groups, haemoglobin, immunity, haemostasis.Cardiovascular System: Comparative anatomy of heart structure, ECG – its principle and significance, cardiac cycle.

Respiratory system: Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, Breathing mechanism, neural and chemical regulation of respiration.

Nervous system - Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system.

Sense organs - Vision, hearing and tactile response.

Excretory system - Comparative physiology of excretion, kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, blood volume, blood pressure, electrolyte balance, acid-base balance.

Digestive system: Digestion, absorption, energy balance, BMR.

Endocrinology and reproduction - Endocrine glands, basic mechanism of hormone action, hormones and diseases; reproductive processes, gametogenesis, ovulation, neuroendocrine regulation.

8. **Inheritance Biology**

Mendelian principles: Dominance, segregation, independent assortment. Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests. Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions, pleiotropy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. Extra chromosomal inheritance: Inheritance of Mitochondrial and chloroplast genes, maternal inheritance. Human genetics: Pedigree analysis, karyotypes, genetic disorders.Quantitative genetics: Polygenic inheritance,Mutation: Types, causes and detection, mutant types.Structural and numerical alterations of chromosomes. Recombination: Homologous and non-homologous recombination including transposition.

9. **Genetic Engineering**

Plant Tissue culture, types of plant tissue culture, germplasm conservation, organ culture; evolution of continuous cell lines.Construction ofcDNA library, Construction of Genomic library, Screening and preservation of DNA libraries. Gene transfer techniques: biological methods; chemical methods; physical or mechanical methods.

Restriction enzymes; Transformation of plant cells; different type of vectors, PCR and hybridization methods; Transgene selection and silencing; Generation and maintenance of transgenic plants, Bt cotton, golden rice and some others as examples. Gene therapy: Introduction and Methods, Gene targeting and silencing, Gene therapy in the treatment of diseases, Challenges, future and ethical considerations in human gene therapy. Stem cells: Culture, identification, maintenance, characterization and proliferation heterogeneity.

10. **Statisitcal Methods:**

Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; X2 test; Basic introduction to Muetrovariate statistics, etc.

11. **METHODS IN BIOLOGY**

Molecular Biology and Recombinant DNA methods:

Isolation and purification of RNA, DNA (genomic and plasmid). Analysis of RNA, DNA and proteins by one- and two-dimensional gel electrophoresis, Isoelectric focusing gels. DNA sequencing methods, strategies for genome sequencing. RFLP, RAPD and AFLP techniques. Detection of molecules using ELISA, RIA, western blot, immunoprecipitation, flow cytometry and immunofluorescence microscopy, in situ localization by techniques such as FISH and GISH. Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering, different types of mass spectrometry.

Visulization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, different fixation and staining techniques for EM, freeze-etch and freeze fracture methods for EM, image processing methods in microscopy.

School of Biological and Biomedical Sciences

Department of Clinical Research

(Ph.D. Entrance Syllabus)

1. Fundamentals of Clinical Research

   Introduction to Clinical Research, Area for clinical research, need and schope of clinical research, Different phases of clinical trial, placebo, Bioavailability and Bioequivalence trial
2. Aspects of Clinical Trials Operations

   Types of design, Operational Introduction, Patient Recruitment and Retention, Role and Responsibilities of Clinical Trial Stakeholders, Study Protocol, Case report form, Informed consent form, Clinical Study Report, SOP, Essential Documents, Conflict of interest in Research, Investigator's Brochure, Source data verification
3. Regulatory Affairs

   USFDA, 21 CFR, ICH, EMA, MHRA, CDSCO, ICMR, Medical Device Regulation in India, Vaccine Regulation, Biologics Regulation, EMEA, GCP, SOP, Australia Regulation (TGA), Japan Drug Regulation (MHLW, PMDA), Brazil Guideline (ANVISA)
4. Clinical Trial Design

Objectives of clinical trial design, types of designs- observational, interventional, prospective, retrospective, single and multicentric, randomization, nonrandomization, crossover design, parallel design, comparative design, non-comparative design, single arm, multiple arm, appropriate hypotheses(superiority, inferiority, non-inferiority, equivalency)

5. Pharmacovigilance

   Introduction to Pharmacovigilance, History, need and scope of Pharmacovigilance, Pharmacovigilance Planning and methods, Definitions and classification of ADRs Detection and reporting, Causality assessment, Severity and seriousness assessment, Predictability and preventability assessment, Management of adverse drug reactions, Pharmacovigilance global perspective

6. Ethics in Clinical Research

Tuskegee experiment, Thalidomide disaster, Kefauvers Harris amendments act, Declaration of Helsinki, Belmont report, Establishment of CIOMS and NIH, Overview of IRB/IEC

7. Clinical Trial Management

   Study Protocol, Compensation/Injury management in Clinical trial, Selection of an Investigator and Site, Managing projects, Regulatory Binder, Project auditing, Inspection, Fraud and Misconduct, Project budgeting, Project risk, Trial designs of common diseases

Interdisciplinary Subjects

1. Anatomy and Physiology

   Animal Cell, Tissue, Organs and systems, homeostasis, Locomotion and Support, GIT, Cardiovascular System, Respiratory System, Endocrine system, Excretory system,
2. Basic Biochemistry

Water, Protein, Carbohydrates, Fat, Nucleic acid, Enzymes and Hormones

3. Pharmacology

Introduction to pharmacology, Drug Administration, Dosage forms of Drug, Pharmacodynamics and Pharmacokinetics

4. Drug Discovery and Development

Sources of new drugs and compounds for screenings a potential drug, Drug design, High through put screening, Structure activity relationship, Quantitative structure activity relationship, Computer assisted drug designing

5. Research Methodology

Introduction to research, Sampling and Analysis, Experimental Design and Hypothesis, Computer application and Research report

6. **Biostatistics**

Data, Types of Data, Presentation of Data, Measures of central tendency and Dispersion, Range, Correlation and regression, Probability, Hypothesis testing,

Department of Sociology

Syllabus

Ph D (Sociology) Entrance Examination 2019-20

Unit-1: Classical Sociological Theory

The social, historical, political and intellectual background of Emergence of Sociology; August Comte and Saint Simon(Idea of Collective Philosophy, Sociology ─ Positivism ─ social evolution, Hierarchy of Sciences); Emile Durkheim (Social Solidarity, Division of Labour, Social Facts, Suicide, Anomie, Elementary forms of religious Life), Karl Marx (historical and dialectical materialism ─ class conflict ─ capital ─ base and super structure, religion and society); Max Weber (social Action─ methodology─ authority ─ class, status and power ─ religion and economy)

Unit-2 : Modern Sociological Theory

Conflict Theory and Neo-Marxism (Randal Collins ─ Lewis A Coser ─ Ralf H Dahrendorf ─ Antonio Gramsci ─ Louis Althusser ─ J H Habermas) Functionalism and Neo-Functionalism (Talcott Parsons─ Robert Merton ─Jefferey C Alexander) Interpretative Sociology (G.H. Mead ─ Harold J Garfinkel ─ Erving Goffman ─ Alfred Schutz ─ Peter L Berger ─ Luckmann─G H Mead.

Unit-3 : Neo Sociological Theory

Post Modern Thinkers and Theories: Radical Rupture in Modern Society (Jean Baudrillard) Discourse of Power and Knowledge(Michel Foucalt). Neo Sociological Theories: The Structuration Theory (Anthony Giddens), New Cultural Logic of Capitalism (Fredric Jameson)

Unit-4: Social Research Method

Meaning and nature (social phenomena ─ scientific enquiry ─ objectivity and subjectivity ─ fact and value); Quantitative methods (survey ─ research design ─ hypothesis ─ sampling , techniques of data collection: observation, questionnaire and interview); Qualitative methods (participant observation ─ case

study ─ content analysis ─ oral history ─ life history); Statistical tools (measures of central tendency─ measures of dispersion ─ correlation ─ test of significance ─ reliability and validity).

Unit-5: Sociology of India

Approaches to the Study of Indian Society (Indology ─ Civilizational ─ Functional ─ Marxist ─ Subaltern); People of India (groups and communities─ unity and diversity ─ pluralism); Caste structure and change (Tribe and Caste─ forms of caste ─ caste and social institutions ─ changes in caste system); Rural social structure (village community ─ change in village community); Family, kinship and marriage; Religion in India (ideology ─ organization ─ religious movement)

Unit-6: Social Stratification and Mobility

Theories of social stratification (social class ─ class, status, and party ─ cultural stratification);Issues in stratification (difference ─ hierarchy ─ equality and inequality); Forms of stratification (caste ─ class ─ gender ─ ethnic); Stratification and social mobility in India; Caste and Class: A reinterpretation;

Unit-7: Economy and Society

Theories on economic social relationship; Features of industrial society (factory system ─ division of labor─ bureaucracy ─ rationality─ production relations ─ surplus value ─ alienation); Relationships (labor ─ management ─ conciliation ─ adjudication ─ arbitration─ collective bargaining ─ trade unions ─ Joint management councils ─ quality circles); Agriculture, Industry and service sectors; Industrialization and social change in India; Industrial planning.

Unit-8: Political Sociology

Approaches to the study of politics; Concepts (power and authority ─ consensus and conflict─ elites and masses─ state and stateless societies); Local, everyday power and wider political system; State and society under capitalism; Citizenship and the welfare state; sovereignty and institutional autonomy; state and society in India; Civil society and social mobilization.

Unit-9: Sociology of Development

Conceptual perspectives (economic─ human ─ social ─ sustainable ─ ecological notions of development); Theories of underdevelopment (Max Weber ─ Gunnar Myrdal ─ Frank ─ Samir Amin ─ Wallerstein); Paths of development (modernization ─ globalization ─Socialist ─ Mixed ─Gandhian); Social structure and development; Culture and development

Unit-10: Family, Kinship and Marriage

Theories; family (types ─ characteristics) kinship (incest taboo ─ honor ─ descent, residence and inheritance); Marriage patterns (exchange ─ alliance ─ bride-wealth ─ dowry ─ social reproduction ─ monogamy ─ plural marriages); Culture,law and economy; Indian case.

DEPARTMENT OF PSYCHOLOGY

Syllabus for Ph.D. Entrance Examination 2020

1. Foundations and Methods of Psychology
2. Research Methods and statistics in Social Sciences
3. Development of Human Behaviour
4. Psychological Processes
5. Issues and perspectives in Modern Contemporary Psychology
6. Organisational Psychology
7. Personality and Cognitive Psychology
8. Physiological Psychology
9. Psychopathology and Clinical Psychology
10. Experimental Psychology

DEPARTMENT OF POLITICAL SCIENCE

SCHOOL OF LIBERAL EDUCATION (SLE)

Syllabus for PhD Entrance 2020-21

Unit –I:	Indian Government and Politics
Unit –II:	Political theory
Unit –III:	Indian Political Thought
Unit –IV:	Western Political Thought
Unit –V:	International Relations
Unit –VI:	Foreign Policy
Unit –VII:	Public Administration
Unit –VIII:	Human Rights
Unit- IX:	Comparative Politics
Unit X:	Gender Issues
Unit XI:	Research Methodology

Note: All units will cover maximum courses from Political Science

DEPARTMENT OF ECONOMICS

Syllabus – Ph D entrance examination in Economics 2020

I. MACROECONOMICS

• National Income Accounting Methods • Classical Model, Keynesian Model, IS-LM Model, Fiscal and Monetary Policies • Inflation, Index Numbers • Exchange Rate Systems • Balance of Payments • Open Economy Macroeconomics.

II. MICROECONOMICS

• Consumer Behaviour • Production and Costs • Markets • Theory of Distribution / Theory of Factor Markets.

III. MATHEMATICS, STATISTICS & BASIC ECONOMETRICS

• Mathematics: Matrix, Determinants, and Calculus: Differentiation and integrations

• Statistics: Probability, Probability Distributions – Binomial, Poisson, Uniform and Normal, Measures of Central Tendency, Skewness, Kurtosis, Dispersion, Correlation and Regression

• Econometrics: Assumptions of the CLRM and properties of the estimators, OLS, Gauss Markov theorem, Violations of CLRM assumptions (detection & remedies).

IV. RESEARCH METHODOLOGY:

• Types of Research • Questionnaire and Questionnaire Design • Sampling and Sampling Distributions • Hypothesis Testing.

DEPARTMENT OF ENGLISH

SCHOOL OF LIBERAL EDUCATION (SLE)

GALGOTIAS UNIVERSITY, GREATER NOIDA

Syllabus for PhD Entrance 2020-21

Subject: English

Unit –I:	Poetry
Unit –II:	Drama
Unit –III:	Fiction, short story
Unit –IV:	Non-Fictional Prose
Unit –V:	Language: Basic concepts, theories and pedagogy. English in Use.
Unit –VI:	Cultural Studies
Unit –VII:	Literary Criticism (Indian and Western)
Unit –VIII:	Literary Theory post World War II
Unit- IX:	American Literature
Unit X:	Indian Writing in English
Unit XI:	Research Methodology

Note: All units will cover all literature in English

MANAGEMENT STUDIES

Unit – I

Management – Concept, Process, Theories and Approaches, Management Roles and Skills

Functions – Planning, Organizing, Staffing, Coordinating and Controlling.

Communication – Types, Process and Barriers.

Decision Making – Concept, Process, Techniques and Tools

Organisation Structure and Design – Types, Authority, Responsibility, Centralisation, Decentralisation and Span of Control

Managerial Economics – Concept & Importance

Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting

Market Structures – Market Classification & Price Determination

National Income – Concept, Types and Measurement

Inflation – Concept, Types and Measurement

Business Ethics & CSR

Ethical Issues & Dilemma

Corporate Governance

Value Based Organisation

unit – II

Organisational Behaviour – Significance & Theories

Individual Behaviour – Personality, Perception, Values, Attitude, Learning and Motivation

Group Behaviour – Team Building, Leadership, Group Dynamics

Interpersonal Behaviour & Transactional Analysis

Organizational Culture & Climate

Work Force Diversity & Cross Culture Organisational Behaviour

Emotions and Stress Management

Organisational Justice and Whistle Blowing

Human Resource Management – Concept, Perspectives, Influences and Recent Trends

Human Resource Planning, Recruitment and Selection, Induction, Training and Development

Job Analysis, Job Evaluation and Compensation Management

Unit – III

Strategic Role of Human Resource Management

Competency Mapping & Balanced Scoreboard

Career Planning and Development

Performance Management and Appraisal

Organization Development, Change & OD Interventions

Talent Management & Skill Development

Employee Engagement & Work Life Balance

Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security

Trade Union & Collective Bargaining

International Human Resource Management – HR Challenge of International Business

Green HRM

Unit– IV

Accounting Principles and Standards, Preparation of Financial Statements

Financial Statement Analysis – Ratio Analysis, Funds Flow and Cash Flow Analysis, DuPont Analysis

Preparation of Cost Sheet, Marginal Costing, Cost Volume Profit Analysis

Standard Costing & Variance Analysis

Financial Management, Concept & Functions

Capital Structure – Theories, Cost of Capital, Sources and Finance

Budgeting and Budgetary Control, Types and Process, Zero base Budgeting

Leverages – Operating, Financial and Combined Leverages, EBIT–EPS Analysis, Financial Breakeven Point & Indifference Level.

Unit –V

Value & Returns – Time Preference for Money, Valuation of Bonds and Shares, Risk and Returns;

Capital Budgeting – Nature of Investment, Evaluation, Comparison of Methods; Risk and Uncertainly Analysis

Dividend – Theories and Determination

Mergers and Acquisition – Corporate Restructuring, Value Creation, Merger Negotiations, Leveraged Buyouts, Takeover

Portfolio Management – CAPM, APT Derivatives – Options, Option Payoffs, Option Pricing, Forward Contracts & Future Contracts

Working Capital Management – Determinants, Cash, Inventory, Receivables and Payables Management, Factoring

International Financial Management, Foreign exchange market

Unit - VI

Strategic Management – Concept, Process, Decision & Types

Strategic Analysis – External Analysis, PEST, Porter’s Approach to industry analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis

Strategy Formulation – SWOT Analysis, Corporate Strategy – Growth, Stability, Retrenchment, Integration and Diversification, Business Portfolio Analysis - BCG, GE Business Model, Ansoff's Product Market Growth Matrix

Strategy Implementation – Challenges of Change, Developing Programs Mckinsey 7s Framework

Marketing – Concept, Orientation, Trends and Tasks, Customer Value and Satisfaction

Market Segmentation, Positioning and Targeting

Product and Pricing Decision – Product Mix, Product Life Cycle, New Product development, Pricing – Types and Strategies

Place and promotion decision – Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion

Unit –VII

Consumer and Industrial Buying Behaviour: Theories and Models of Consumer Behaviour

Brand Management – Role of Brands, Brand Equity, Equity Models, Developing a Branding Strategy; Brand Name Decisions, Brand Extensions and Loyalty Logistics and Supply Chain Management, Drivers, Value creation, Supply Chain Design, Designing and Managing Sales Force, Personal Selling Service Marketing – Managing Service Quality and Brands, Marketing Strategies of Service Firms

Customer Relationship Marketing – Relationship Building, Strategies, Values and Process

Retail Marketing – Recent Trends in India, Types of Retail Outlets.

Emerging Trends in Marketing – Concept of e-Marketing, Direct Marketing, Digital Marketing and Green Marketing

International Marketing – Entry Mode Decisions, Planning Marketing Mix for International Markets

Unit –VIII

Statistics for Management: Concept, Measures Of Central Tendency and Dispersion, Probability Distribution – Binominal, Poison, Normal and Exponential

Data Collection & Questionnaire Design

Sampling – Concept, Process and Techniques

Hypothesis Testing – Procedure; T, Z, F, Chi-square tests

Correlation and Regression Analysis

Operations Management – Role and Scope

Facility Location and Layout – Site Selection and Analysis, Layout – Design and Process

Enterprise Resource Planning – ERP Modules, ERP implementation

Scheduling; Loading, Sequencing and Monitoring

Quality Management and Statistical Quality Control, Quality Circles, Total Quality Management – KAIZEN, Benchmarking, Six Sigma; ISO 9000 Series Standards

Operation Research – Transportation, Queuing Decision Theory, PERT / CPM

Unit –IX

International Business – Managing Business in Globalization Era; Theories of International Trade; Balance of payment

Foreign Direct Investment – Benefits and Costs

Multilateral regulation of Trade and Investment under WTO

International Trade Procedures and Documentation; EXIM Policies

Role of International Financial Institutions – IMF and World Bank

Information Technology – Use of Computers in Management Applications; MIS, DSS

Artificial Intelligence and Big Data

Data Warehousing, Data Mining and Knowledge Management – Concepts

Managing Technological Change

Unit – X

Entrepreneurship Development – Concept, Types, Theories and Process, Developing Entrepreneurial Competencies

Intrapreneurship – Concept and Process

Women Entrepreneurship and Rural Entrepreneurship

Innovations in Business – Types of Innovations, Creating and Identifying Opportunities, Screening of Business Ideas

Business Plan and Feasibility Analysis – Concept and Process of Technical, Market and Financial Analysis

Micro and Small Scale Industries in India; Role of Government in Promoting SSI

Sickness in Small Industries – Reasons and Rehabilitation

Institutional Finance to Small Industries – Financial Institutions, Commercial Banks, Cooperative Banks, Micro Finance

SCHOOL OF MEDIA AND MASS COMMUNICATION

Unit - 1

Introduction to Journalism and Mass Communication

a. Concept of Journalism and mass communication, mass communication in India.

b. History, growth and development of print and electronic media. Major landmarks in print and electronic media in Indian languages. Media's role in formulation of states of India.

c. Media criticism and media literacy, Press Council and Press Commissions of India, status of journalism and media education in India. Media policies of the Government of India since Independence.

d. Models and theories of mass communication, normative theories, administrative and critical traditions in communication, media and journalism studies, communication and theories of socio-cultural, educational and agricultural change. Technological determinism, critique of Marshall McLuhan's views on media and communication and Marxist approaches. Information and knowledge societies.

e. Indian traditions and approaches to communication from the Vedic era to the 21st century. Western and Eastern philosophical, ethical and aesthetic perceptions of communication - Aristotle and Plato, Hindu, Buddhist, and Islamic traditions.

f. Media and culture - framework for understanding culture in a globalised world. Globalisation with respect to politico-economic & socio-cultural developments in India.

Unit - 2

Communication for Development and Social Change

a. Concept and definition of development communication, role of media and journalism in society, characteristics of Indian society – demographic and sociological impact of communication, media and journalism. Media and specific audiences.

b. Development and social change. Issues and post-colonial conceptions.

c. Deconstruction of dominant paradigm of communication and development. Responses and critique of dominant models.

d. Corporatisation of development - Corporate Social Responsibility, non-state actors in development, mass campaigns by NGOs, Government of India, international agencies and corporates. Paradigms and discourse of development communication.

e. Emergence of global civil societies, public sphere, global communication system - nation state-universal, national communication policies.

f. Leading influencers of social reform in India - Raja Rammohan Roy, Pandit Madanmohan Malviya, Bal Gangadhar Tilak, Mahatma Jyotiba Phule, Mahatma Gandhi, Acharya Vinoba Bhave, Dr B. R. Ambedkar, Deendayal Upadhyay, Dr Ram Manohar Lohia etc.

Unit - 3

Reporting and Editing

a. News-concepts, determinants (values), structure and perspectives. Reporting for print, radio, television and digital media. Types of reporting. National and international news agencies and feature syndicates, functions and role.

b. Writing for print, electronic and digital news media. Translation and transcreation.

c. Editing and presentation techniques for print, television and digital media.

d. Journalism as profession, reportage of contemporary issues, ethics of reporting.

e. Critique of western news values, effect of new technology on global communication flows.

f. Niche Reporting.

Unit - 4

Advertising and Marketing Communication

a. Definition, concept, functions, types, evolution of advertising, standards and ethics in advertising. Theories and models of communication in advertising.

b. Brand management.

c. Advertising management - agency-role, structure and function, client-agency relationship, media planning and budgeting.

d. Advertising and creativity, language and translation.

e. Advertising campaign and marketing.

f. Advertising and marketing research.

Unit - 5

Public Relations and Corporate Communication

a. Public Relations and Corporate Communication - definition, concept and scope.

b. Structure of PR in State, Public, Private and non-government sectors.

c. Tools and techniques of PR and Corporate Communication.

d. Crisis communication and crisis communication management.

e. Ethics of Public Relations.

f. International Public Relations, communication audit.

Unit - 6

Media Laws and Ethics

a. Concept of law and ethics in India and rest of the world.

b. The Constitution of India, historical evolution, relevance.

c. Concept of freedom of speech and expression in Indian Constitution.

d. Defamation, Libel, Slander-IPC 499-502, Sedition IPC 124(A), Contempt of Courts Act 1971, Official Secrets Act 1923, Press and Registration of Books Act 1867, Working Journalists and other Newspaper

Employees (Conditions of Service) and Miscellaneous Provisions Act 1955, Wage Boards, Law of Obscenity (Section 292-294 of IPC); the Miller test, the Hicklin test, Indecent Representation of Women (Prohibition) Act 1986, Scheduled Castes and Tribes (Prevention of Atrocities) Act, 1989, Parliamentary Privileges. Famous cases involving journalists and news media organisations.

e. Right to Information Act 2005, Copyright Act 1957, Intellectual Property Rights, Cable Television Network (Regulation) Act 1995, Information Technology Act (relevant) 2000 and cyber laws, Cinematograph Act 1952, Film Censorship, Press Council Act as amended from time to time, IPR, ASCI, Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954, Various regulatory bodies for print, TV, Advertising, PR, and Internet.

f. Rules, regulations and guidelines for the media as recommended by Press Council of India, Information and Broadcasting ministry and other professional organisations, adversarial role of the media, human rights and media.

Unit – 7

Media Management and Production

a. Definition, concept of media management. Grammar of electronic media.

b. Communication design theories and practice.

c. Media production techniques – print and electronic.

d. Digital media production techniques.

e. Economics and commerce of mass media in India.

f. Principles and management in media industry post liberalisation.

Unit – 8

ICT and Media

a. ICT and media - definition, characteristics and role. Effect of computer mediated communication. Impact of ICT on mass media. Digitisation.

b. Social networking.

c. Economics and commerce of web enabled media.

d. Mobile adaption and new generation telephony by media, ethics and new media.

e. ICT in education and development in India, online media and e-governance.

f. Animation - concepts and techniques.

Unit - 9

Film and Visual Communication

a. Film and television theory.

b. Film and identity in Indian film studies, leading film directors of India before and after Independence. Indian cinema in the 21st century.

c. Approaches to analysis of Indian television.

d. Visual Communication. Visual analysis.

e. Basics of film language and aesthetics, the dominant film paradigm, evolution of Indian cinema-commercial and 'non-commercial' genres, the Hindi film song, Indian aesthetics and poetics (the theory of Rasa and Dhvani).

f. National cinema movements: Soviet Montage cinema, German Expressionistic cinema, Italian Neo-Realistic cinema, French New Wave cinema, British New Wave cinema, Indian New Wave cinema, Period cinema. Cinema in the new millennium.

Unit - 10

Communication Research

a. Definition, concept, constructs and approaches to communication research process.

b. Research Designs - types, structure, components, classical, experimental and quasi experimental, variables and hypotheses; types and methods of research; basic, applied, descriptive, analytical, historical, case study, longitudinal studies.

c. Research in journalism, Public Relations, advertising, cinema, animation and graphics, television, Internet, social media practices, magazines, children's media. Communication, journalism and media research in India.

d. Levels of measurement: sampling-probability and non-probability, tests of validity and reliability, scaling techniques. Methods and tools of data collection-interviews, surveys, case studies, obtrusive and non-obtrusive techniques, ethnography, schedule, questionnaire, dairy, and internet based tools, media specific methods such as exit polls, opinion polls, telephone, SMS surveys and voting with regard to GEC (general entertainment content).

e. Data analysis, testing, interpretation, application of statistical tests-parametric and non-parametric, tests of variance-univariate, bivariate and multivariate, tests of significance, computer mediated research.

f. Ethical considerations in communication, media and journalism research, writing research reports, plagiarism.

SYLLABUS

Unit 1: Educational Studies

a) Contribution of Indian Schools of philosophy (Sankhya Yoga, Vedanta, Buddhism, Jainism) with special reference to Vidya, Dayanand Darshan; and Islamic traditions towards educational aims and methods of acquiring valid knowledge

b) Contribution of Western schools of thoughts (Idealism, Realism, Naturalism, Pragmatism, Marxism, Existentialism) and their contribution to Education with special reference to information, knowledge and wisdom

c) Approaches to Sociology of Education (symbolic Interaction, Structural Functionalism and Conflict Theory). Concept and types of social Institutions and their functions (family, school and society), Concept of Social Movements, Theories of Social Movements (Relative Deprivation, Resource Mobilization, Political Process Theory and New Social Movement Theory)

d) Socialization and education- education and culture; Contribution of thinkers (Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, Aurobindo, J.Krishnamurthy, Paulo Freire, Wollstonecraft, Nel Noddings and Savitribai Phule) to the development of educational thought for social change, National Values as enshrined in the Indian Constitution - Socialism, Secularism, justice, liberty, democracy, equality, freedom with special reference to education

Unit 2: History, Politics and Economics of Education

a) Committees and Commissions' Contribution to Teacher Education Secondary Education Commission (1953), Kothari Education Commission (1964-66), National Policy of Education (1986,1992), National Commission on Teachers (1999), National Curriculum Framework 2005, National Knowledge Commission (2007), Yashpal Committee Report (2009), National Curriculum Framework for Teacher Education (2009), Justice Verma Committee Report (2012)

b) Relationship between Policies and Education, Linkage between Educational Policy and National Development, Determinants of Educational Policy and Process of Policy formulation: Analysis of the existing situation, generation of policy options, evaluation of policy options, making the policy decision, planning of policy implementation, policy impact assessment and subsequent policy cycles.

c) Concept of Economics of Education: Cost Benefit Analysis Vs Cost Effective Analysis in Education, Economic returns to Higher Education Signaling Theory Vs Human Capital Theory, Concept of Educational Finance; Educational finance at Micro and Macro Levels, Concept of Budgeting

d) Relationship Between Politics and Education, Perspectives of Politics of Education Liberal, Conservative and Critical, Approaches to understanding Politics (Behaviouralism, Theory of Systems Analysis and Theory of Rational Choice), Education for Political Development and Political Socialization

Unit 3: Learner and Learning Process

a) Growth and Development: Concept and principles ,Cognitive Processes and stages of Cognitive Development , Personality: Definitions and theories (Freud, Carl Rogers, Gordon Allport, Max Wertheimer, Kurt Koffka) , Mental health and Mental hygiene

b) Approaches to Intelligence from Unitary to Multiple: Concepts of Social intelligence, multiple intelligence, emotional intelligence Theories of Intelligence by Sternberg, Gardner, Assessment of Intelligence, Concepts of Problem Solving, Critical thinking, Metacognition and Creativity Page 3 of 8

c) Principles and Theories of learning: Behaviouristic, Cognitive and Social theories of learning, Factors affecting social learning, social competence, Concept of social cognition, understanding social relationship and socialization goals

d) Guidance and Counselling: Nature, Principles and Need, Types of guidance (educational, vocational, personal, health and social & Directive, Non-directive and Eclectic), Approaches to counselling – Cognitive-Behavioural (Albert Ellis – REBT) & Humanistic, Personcentred Counselling (Carl Rogers) - Theories of Counselling (Behaviouristic, Rational, Emotive and Reality)

Unit 4: Teacher Education

a) Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programs, The Structure of Teacher Education Curriculum and its Vision in Curriculum Documents of NCERT and NCTE at Elementary, Secondary and Higher Secondary Levels , Organization of Components of Pre-service Teacher Education Transactional Approaches (for foundation courses) Expository, Collaborative and Experiential learning

b) Understanding Knowledge base of Teacher Education from the view point of Schulman, Deng and Luke & Habermas, Meaning of Reflective Teaching and Strategies for Promoting Reflective Teaching, Models of Teacher Education - Behaviouristic, Competency-based and Inquiry Oriented Teacher Education Models

c) Concept, Need, Purpose and Scope of In-service Teacher Education, Organization and Modes of In-service Teacher Education, Agencies and Institutions of In-service Teacher Education at District, State and National Levels (SSA, RMSA, SCERT, NCERT, NCTE and UGC), Preliminary Consideration in Planning in-service teacher education programme (Purpose, Duration, Resources and Budget)

d) Concept of Profession and Professionalism, Teaching as a Profession, Professional Ethics of Teachers, Personal and Contextual factors affecting Teacher Development, ICT Integration, Quality Enhancement for Professionalization of Teacher Education, Innovation in Teacher Education Page 4 of 8

Unit 5: Curriculum Studies

a) Concept and Principles of Curriculum, Strategies of Curriculum Development, Stages in the Process of Curriculum development, Foundations of Curriculum Planning - Philosophical Bases (National, democratic), Sociological basis (socio cultural reconstruction), Psychological Bases (learner’s needs and

interests),Bench marking and Role of National level Statutory Bodies - UGC, NCTE and University in Curriculum Development

b) Models of Curriculum Design: Traditional and Contemporary Models (Academic / Discipline Based Model, Competency Based Model, Social Functions / Activities Model [social reconstruction], Individual Needs & Interests Model, Outcome Based Integrative Model , Intervention Model, C I P P Model (Context, Input, Process, Product Model)

c) Instructional System, Instructional Media, Instructional Techniques and Material in enhancing curriculum Transaction, Approaches to Evaluation of Curriculum : Approaches to Curriculum and Instruction (Academic and Competency Based Approaches), Models of Curriculum Evaluation: Tyler's Model, Stakes' Model, Scriven's Model, Kirkpatrick's Model

d) Meaning and types of Curriculum change, Factors affecting curriculum change, Approaches to curriculum change, Role of students, teachers and educational administrators in curriculum change and improvement, Scope of curriculum research and Types of Research in Curriculum Studies

Unit 6: Research in Education

a) Meaning and Scope of Educational Research, Meaning and steps of Scientific Method, Characteristics of Scientific Method (Replicability, Precision, Falsifiability and Parsimony), Types of Scientific Method (Exploratory, Explanatory and Descriptive), Aims of research as a scientific activity: Problem-solving, Theory Building and Prediction, Types of research (Fundamental, Applied and Action), Approaches to educational research (Quantitative and Qualitative), Designs in educational research (Descriptive, Experimental and Historical)

b) Variables: Meaning of Concepts, Constructs and Variables, Types of Variables (Independent, Dependent, Extraneous, Intervening and Moderator), Hypotheses - Concept, Sources, Types (Research, Page 5 of 8 Directional, Non-directional, Null), Formulating Hypothesis, Characteristics of a good hypothesis, Steps of Writing a Research Proposal, Concept of Universe and Sample, Characteristics of a good Sample, Techniques of Sampling (Probability and Non-probability Sampling), Tools of Research - Validity, Reliability and Standardisation of a Tool, Types of Tools (Rating scale, Attitude scale, Questionnaire, Aptitude test and Achievement Test, Inventory), Techniques of Research (Observation, Interview and Projective Techniques)

c) Types of Measurement Scale (Nominal, Ordinal, Interval and Ratio), Quantitative Data Analysis - Descriptive data analysis (Measures of central tendency, variability, fiduciary limits and graphical presentation of data), Testing of Hypothesis (Type I and Type II Errors), Levels of Significance, Power of a statistical test and effect size, Parametric Techniques, Non- Parametric Techniques , Conditions to be satisfied for using parametric techniques, Inferential data analysis, Use and Interpretation of statistical techniques: Correlation, t-test, z-test, ANOVA, chi-square (Equal Probability and Normal Probability Hypothesis). Qualitative Data Analysis - Data Reduction and Classification, Analytical Induction and Constant Comparison, Concept of Triangulation d) Qualitative Research Designs: Grounded Theory

Designs (Types, characteristics, designs, Steps in conducting a GT research, Strengths and Weakness of GT) - Narrative Research Designs (Meaning and key Characteristics, Steps in conducting NR design), Case Study (Meaning, Characteristics, Components of a CS design, Types of CS design, Steps of conducting a CS research, Strengths and weaknesses), Ethnography (Meaning, Characteristics, Underlying assumptions, Steps of conducting ethnographic research, Writing ethnographic account, Strengths and weaknesses), Mixed Method Designs: Characteristics, Types of MM designs (Triangulation, explanatory and exploratory designs), Steps in conducting a MM designs, Strengths and weakness of MM research.

Unit 7: Pedagogy, Andragogy and Assessment

a) Pedagogy, Pedagogical Analysis - Concept and Stages, Critical Pedagogy- Meaning, Need and its implications in Teacher Education, Organizing Teaching: Memory Level (Herbartian Model), Understanding Level (Morrison teaching Model), Reflective Level (Bigge and Hunt teaching Model), Concept of Andragogy in Education: Page 6 of 8 Meaning, Principles, Competencies of Self-directed Learning, Theory of Andragogy (Malcolm Knowles), The Dynamic Model of Learner Autonomy

b) Assessment – Meaning, nature, perspectives (assessment for Learning, assessment of learning and Assessment of Learning) - Types of Assessment (Placement, formative, diagnostic, summative) Relations between objectives and outcomes , Assessment of Cognitive (Anderson and Krathwohl), Affective (Krathwohl) and psychomotor domains (R.H. Dave) of learning

c) Assessment in Pedagogy of Education: Feedback Devices: Meaning, Types, Criteria, Guidance as a Feedback Devices: Assessment of Portfolios, Reflective Journal, Field Engagement using Rubrics, Competency Based Evaluation, Assessment of Teacher Prepared ICT Resources

d) Assessment in Andragogy of Education - Interaction Analysis: Flanders' Interaction analysis, Galloway's system of interaction analysis (Recording of Classroom Events, Construction and Interpretation of Interaction Matrix), Criteria for teacher evaluation (Product, Process and Presage criteria, Rubrics for Self and Peer evaluation (Meaning, steps of construction).

Unit 8: Technology in/ for Education

a) Concept of Educational Technology (ET) as a Discipline: (Information Technology, Communication Technology & Information and Communication Technology (ICT) and Instructional Technology, Applications of Educational Technology in formal, non formal (Open and Distance Learning), informal and inclusive education systems, Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design (Skinner, Piaget, Ausubel, Bruner, Vygotsky), Relationship between Learning Theories and Instructional Strategies (for large and small groups, formal and non formal groups)

b) Systems Approach to Instructional Design, Models of Development of Instructional Design (ADDIE, ASSURE, Dick and Carey Model Mason's), Gagne's Nine Events of Instruction and Five E's of Constructivism, Nine Elements of Constructivist Instructional Design, Application of Computers in

Education: CAI, CAL, CBT, CML, Concept, Process of preparing ODLM, Concept of e learning, Approaches to e Page 7 of 8 learning (Offline, Online, Synchronous, Asynchronous, Blended learning, mobile learning)

c) Emerging Trends in e learning: Social learning (concept , use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum), Open Education Resources (Creative Common, Massive Open Online Courses; Concept and application), E Inclusion - Concept of E Inclusion, Application of Assistive technology in E learning , Quality of E Learning – Measuring quality of system: Information, System, Service, User Satisfaction and Net Benefits (D&M IS Success Model, 2003), Ethical Issues for E Learner and E Teacher - Teaching, Learning and Research

d) Use of ICT in Evaluation, Administration and Research: E portfolios, ICT for Research - Online Repositories and Online Libraries, Online and Offline assessment tools (Online survey tools or test generators) – Concept and Development.

Unit 9: Educational Management, Administration and Leadership

a) Educational Management and Administration – Meaning, Principles, Functions and importance, Institutional building, POSDCORB, CPM, PERT, Management as a system, SWOT analysis, Taylorism, Administration as a process, Administration as a bureaucracy, Human relations approach to Administration, Organisational compliance, Organinsational development, Organisational climate

b) Leadership in Educational Administration: Meaning and Nature, Approaches to leadership: Trait, Transformational, Transactional, Value based, Cultural, Psychodynamic and Charismatic, Models of Leadership (Blake and Mouton's Managerial Grid, Fiedler's Contingency Model, Tri-dimensional Model, Hersey and Blanchard's Model, Leader-Member Exchange Theory)

c) Concept of Quality and Quality in Education: Indian and International perspective, Evolution of Quality: Inspection, Quality Control, Quality Assurance, Total Quality Management (TQM), Six sigma, Quality Gurus: Walter Shewart, Edward Deming, C.K Pralhad

d) Change Management: Meaning, Need for Planned change, ThreeStep-Model of Change (Unfreezing, Moving, Refreezing), The Japanese Models of Change: Just-in-Time, Poka yoke, Cost of Quality: Appraisal Costs, Failure costs and Preventable costs, Cost Benefit Page 8 of 8 Analysis, Cost Effective Analysis, Indian and International Quality Assurance Agencies: Objectives, Functions, Roles and Initiatives (National Assessment Accreditation Council [NAAC], Performance Indicators, Quality Council of India [QCI] , International Network for Quality Assurance Agencies in Higher Education [INQAAHE].

Unit 10: Inclusive Education

a) Inclusive Education: Concept, Principles, Scope and Target Groups (Diverse learners; Including Marginalized group and Learners with Disabilities), Evolution of the Philosophy of Inclusive Education: Special, Integrated, Inclusive Education, Legal Provisions: Policies and Legislations (National Policy of Education (1986), Programme of Action of Action (1992), Persons with Disabilities Act (1995), National

Policy of Disabilities (2006), National Curriculum Framework (2005), Concession and Facilities to Diverse Learners (Academic and Financial), Rehabilitation Council of India Act (1992), Inclusive Education under Sarva Shiksha Abhiyan (SSA), Features of UNCRPD (United Nations Convention on the Rights of Persons with Disabilities) and its Implication

b) Concept of Impairment, Disability and Handicap, Classification of Disabilities based on ICF Model, Readiness of School and Models of Inclusion, Prevalence, Types, Characteristics and Educational Needs of Diverse learners' Intellectual, Physical and Multiple Disabilities, Causes and prevention of disabilities, Identification of Diverse Learners for Inclusion, Educational Evaluation Methods, Techniques and Tools

c) Planning and Management of Inclusive Classrooms: Infrastructure, Human Resource and Instructional Practices, Curriculum and Curricular Adaptations for Diverse Learners, Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan, Remedial Teaching), ParentProfessional Partnership: Role of Parents, Peers, Professionals, Teachers, School d) Barriers and Facilitators in Inclusive Education: Attitude, Social and Educational, Current Status and Ethical Issues of inclusive education in India, Research Trends of Inclusive Education in India

SCHOOL OF LAW

PHD ENTRANCE EXAMINATION SYLLABUS

UNIT – I: JURISPRUDENCE

1. Nature and sources of law
2. Schools of jurisprudence
3. Law and morality
4. Concept of rights and duties
5. Legal personality
6. Concepts of property, ownership and possession
7. Concept of liability
8. Law, poverty and development
9. Global justice
10. Modernism and post-modernism

UNIT – II: CONSTITUTIONAL AND ADMINISTRATIVE LAW

1. Preamble, fundamental rights and duties, directive principles of state policy.
2. Union and State executive and their interrelationship
3. Union and State legislature and distribution of legislative powers
4. Judiciary
5. Emergency provisions
6. Temporary, transitional and special provisions in respect of certain states
7. Election Commission of India
8. Nature, scope and importance of administrative law
9. Principle of natural justice
10. Judicial review of administrative actions – Grounds.

UNIT – III: PUBLIC INTERNATIONAL LAW AND IHL

1. International law – Definition, nature and basis
2. Sources of International law
3. Recognition of states and governments
4. Nationality, immigrants, refugees and internally displaced persons (IDPs)
5. Extradition and asylum
6. United Nations and its organs
7. Settlement of international disputes
8. World Trade Organization (WTO)
9. International humanitarian law (IHL) - Conventions and protocols
10. Implementation of IHL - Challenges

UNIT – IV: LAW OF CRIMES

1. General principles of criminal liability – *Actus reus* and *mens rea*, individual and group liability and constructive liability
2. Stages of crime and inchoate crimes - Abetment, criminal conspiracy and attempt
3. General exceptions
4. Offences against human body
5. Offences against state and terrorism
6. Offences against property
7. Offences against women and children
8. Drug trafficking and counterfeiting
9. Offences against public tranquility
10. Theories and kinds of punishments, compensation to the victims of crime

UNIT – V: LAW OF TORTS AND CONSUMER PROTECTION

1. Nature and definition of tort
2. General principles of tortious liability
3. General defenses
4. Specific torts – Negligence, nuisance, trespass and defamation
5. Remoteness of damages
6. Strict and absolute liability
7. Tortious liability of the State
8. The Consumer Protection Act 1986 - Definitions, consumer rights and redressal mechanism
9. The Motor Vehicles Act, 1988 - No fault liability, third party insurance and claims tribunal
10. The Competition Act, 2002 - Prohibition of certain agreements, abuse of dominant position and regulation of combinations

UNIT – VI: COMMERCIAL LAW

1. Essential elements of contract and e-contract
2. Breach of contract, frustration of contract, void and voidable agreements
3. Standard form of contract and quasi-contract
4. Specific contracts - Bailment, pledge, indemnity, guarantee and agency
5. Sale of Goods Act, 1930
6. Partnership and limited liability partnership
7. Negotiable Instruments Act, 1881
8. Company law – Incorporation of a company, prospectus, shares and debentures
9. Company law – Directors and meetings
10. Corporate social responsibility

UNIT-VII: FAMILY LAW

1. Sources and schools
2. Marriage and dissolution of marriage
3. Matrimonial remedies - Divorce and theories of divorce
4. Changing dimensions of institution of marriage – *Live-in* relationship

5. Recognition of foreign decrees in India on marriage and divorce
6. Maintenance, dower and *stridhan*
7. Adoption, guardianship and acknowledgement
8. Succession and inheritance
9. Will, gift and *wakf*
10. Uniform Civil Code

UNIT –VIII: ENVIRONMENT AND HUMAN RIGHTS LAW

1. Meaning and concept of 'environment' and 'environmental pollution'
2. International environmental law and UN Conferences
3. Constitutional and legal framework for protection of environment in India
4. Environmental Impact Assessment and control of hazardous waste in India
5. National Green Tribunal
6. Concept and development of human rights
7. Universalism and cultural relativism
8. International Bill of Rights
9. Group rights – Women, children, persons with disabilities, elderly persons, minorities and weaker sections
10. Protection and enforcement of human rights in India – National Human Rights Commission, National Commission for Minorities, National Commission for Women, National Commission for Scheduled Castes, National Commission for Schedule Tribes and National Commission for Backward Classes

UNIT - IX: INTELLECTUAL PROPERTY RIGHTS AND INFORMATION TECHNOLOGY LAW

1. Concept and meaning of intellectual property
2. Theories of intellectual property
3. International conventions pertaining to intellectual properties
4. Copyright and neighboring rights – Subject matters, limitations and exceptions, infringement and remedies
5. Law of patent – Patentability, procedure for grant of patent, limitations and exceptions, infringement and remedies
6. Law of trademark – Registration of trademarks, kinds of trademarks, infringement and passing off, remedies
7. Protection of Geographical Indications
8. Bio-diversity and Traditional Knowledge
9. Information technology law- digital signature and electronic signature, electronic governance, electronic records and duties of subscribers
10. Cyber crimes, penalties and adjudication

UNIT – X: COMPARATIVE PUBLIC LAW AND SYSTEMS OF GOVERNANCE

1. Comparative Law – Relevance, methodology, problems and concerns in Comparison
2. Forms of governments – Presidential and parliamentary, unitary and federal
3. Models of federalism – USA, Canada and India
4. Rule of Law – 'Formal' and 'substantive' versions
5. Separation of powers – India, UK, USA and France

6. Independence of judiciary, judicial activism and accountability – India, UK and USA
7. Systems of constitutional review – India, USA, Switzerland and France
8. Amendment of the Constitution – India, USA and South Africa
9. *Ombudsman* –Sweden, UK and India
10. Open Government and Right to Information - USA, UK and India