



B.Sc. Forensic Science

Syllabus for Entrance Examination for Admission in B.Sc. Forensic Science

Unit Number	Details	Mark
	Chemistry	
1	Periodic Properties: Atomic and ionic radii, ionization energy, electron affinity and electronegativity - Definition, trends in Periodic table. Factors affecting ionization potential. Introduction of atomic structure, Heisenberg's uncertainty principle. Schrodinger wave equation (No derivation), Quantum numbers, shapes of s, p, And d orbitals. Aufbau principle, Pauli's exclusion principle and Hund's rule of maximum multiplicity. Electronic Configuration of elements and ions (Z = 1 to 30) Chemical Kinetics: Introduction, reaction rate, factors affecting the rate of a reaction, Order and molecularity, rate expression for zero and first order reactions. Half-life of reactions, activation energy. Transition state theory and Collision theory	25
2	Chemical bonding: Introduction, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van-der Waals forces, metallic bond, Ionic bond, Covalent bond, Co-ordinate bond elementary ideas of Inductive effect, Electrometric effect, Resonance effect, Hyper conjugation Types of organic reactions: Addition, substitution, elimination reaction and Rearrangement reaction. Gravimetric And Volumetric Analysis: A) Principle, theory and types of Gravimetric analysis, properties of precipitates and precipitating agents, application of gravimetric methods B) Principle, theory and types of volumetric analysis, Acid-base, complexometric, redox and precipitation titrations, applications of Volumetric analysis. Errors in Chemical Analysis: Introduction, Random and Systematic errors, Accuracy, Precision, Uncertainty, Absolute & Relative errors, Mean, Median, Average and Standard deviations, Significant figures.	
	Physics	
	Elasticity: Introduction, Hooke's Law, Young's Modulus, Bulk Modulus & Modulus of Rigidity and Relation between them, Poisson's Ratio, Elastic Limit, Work Done in Stretching a Wire, Bending of Beam, Cantilever Supported at One End and at Both Ends, Torsional Pendulum. Digital Aids in Reconstruction (3D Photography/Videography, Computer aided Reconstruction).	



3	Electrostatics: Coulombs Law in Vacuum, Force between Two Charges, Electric Field Intensity, Electric Potential, Electric Field Intensity due to a Point Charge. Gauss Law, Concept of Capacitance, Parallel Plate Capacitor without and with Dielectric. Electromagnetic Induction, Faradays Law, Lenz's Law, Self and Mutual Induction. Magnetism: Concept of Magnetic Field, Lorentz Force Equation, Biot- Savarts Law, It's Applications (Magnetic Field due to Steady Current in a Long Straight Wire, Magnetic Field along the Axis of Circular Coil), Ampere's Law, It's Applications (Magnetic Field for a Solenoid, a Toroid).	25
4	Mechanics Newton's Law of Motion: Newton's First and Second Law and Their Explanation, Working with Newton's First and Second Law, Newton's Third Law of Motion and Its Explanation, Projectile Motion (Range, Time of Flight, Maximum Vertical Height, Angle of Elevation, Trajectory). Rotational Motion, Centripetal Force, Centrifugal Force, Coriolis-force and its applications. Work and Energy: Kinetic Energy, Work and Work-Energy Theorem, Conservative and Non- Conservative Forces, Potential Energy and Conservation of Mechanical Energy, Change in Potential Energy in Rigid Body Motion, Mass-Energy Equivalence. Oscillations: Definition of Linear and Angular S.H.M., Differential Equation of S.H.M. and Its Solution, Interference of Waves, Beats, Composition of Two Perpendicular Linear S.H.Ms. for Frequencies 1:1 And 1:2 (Analytical Method), Lissajous's Figures and Its Uses, Applications (Mechanical, Electrical and Optical). Wave Motion: Differential Equations of Wave Motion in Continuous Media, Equations for Longitudinal Waves and its Solution (One Dimension Only), Equation for Transverse Waves and Its Solution (One Dimension Only), Energy Density and Intensity of a Wave, Discussion of Seismic Waves, Wave Motion in Strings and Organ Pipes.	
	Biology	
5	The science of biology: definition and characteristics of life, levels of organization in biological world. Origin of life: brief history of earth, geological time scale, Oparin- Haldane hypothesis, Miller's experiment. Five kingdom system of classification. Theories of evolution; Lamarckism, Darwinism, mutation theory, Neo-Darwinism. Brief introduction to chemistry in the biological world: structure of atom, types of chemical bonds- covalent and non-covalent interaction, role of isotopes in biological research. Water: properties of water, ionization of water- H-H equation, pH scale and its importance, importance of water in evolution of life. Botany: Morphology and Anatomy of root stem leaf and flower in monocots and dicots. Plant tissues: Ground tissues: parenchyma, chlorenchyma, collenchyma, and sclerenchyma. Vascular tissues: xylem, phloem. Secretory tissues: laticiferous, glandular. Secondary growth in plants. Growth rings and their role in age estimation of plants. Types of animal tissues structure and function. Palynology: structure of pollen grains, isolation and identification. Pollination.	25
	Genetics Mendel's laws of inheritance, mitochondrial inheritance. Genetic material: Griffith's experiment, Avery, McCleod and McCarty, Harshe and Chase experiment, RNA as genetic material; experimental proof. Structure of DNA: X-	



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6	ray crystallography, Chargaff's rule, Watson-Crick's double helical model of DNA, types of DNA. Types of RNA. Human Genome Project, Central Dogma of Nucleic Acid (Replication, transcription, Translation), Post Translational changes. Cell biology: structure of prokaryotic and eukaryotic cell, cytoskeleton. Plasma membrane: chemical composition, fluid mosaic model, membrane transport-active and passive, functions of plasma membrane. Composition of cytoplasm. Study of cell organelles-nucleus, Endoplasmic reticulum, Golgi Complex, Lysosomes, peroxisomes, glyoxysomes, ribosomes, mitochondria. Cell division- cell cycle, mitosis, meiosis	
	Introduction To Forensic Science	
7	Forensic Science: Definition, Nature, need and functions. Historical development in India and world, Specific contribution of scientists in the field of Forensic Science. Scope of Forensic Science in India and world. Types and classification of Crime Scene, Crime Scene Management Introduction to Crime, Criminalistics and their Historical perspectives. Different agencies involved in crime detection and prevention Indian Police System – State & Central level	25
Total		100



DEPARTMENT OF MICROBIOLOGY
Syllabus for Entrance Examination for Admission in M.Sc. Microbiology

Unit Number	Details	Marks
1	Fundamentals of Microbiology 1.1: Historical perspective of Microbiology: Contribution of different Scientists in the field of Immunology, Medical Microbiology, Food Microbiology and Fermentation, Environmental Microbiology and Genetics and related experimental evidences 1.2: Basics of Microbial Theory: Ubiquity of Microbes, Role of Microbes in nature, Effect of microbes on human health, Knowledge about structure and characteristics of Bacteria, Fungi, Viruses, Protozoa, Algae and Rickettsia, Studies on chemical composition of cell, Difference in prokaryotes and eukaryotes 1.3: Laboratory Microbiology: Working principle of all Laboratory instruments (Compound microscope, Incubator, Hot air oven, Autoclave, Shaker, Vortex mixer), Biosafety in Microbiology lab and levels of containment, Laboratory safety, Restricted area, Laboratory infections and potential hazards	20
2	Basic techniques in Microbiology 2.1: Microscopy: Principles, construction, working and applications of: Dark field microscopy, Fluorescence Microscopy, Phase Contrast microscopy, Transmission Electron Microscope and Scanning Electron Microscope 2.2: Microbial Techniques: Types of Simple, Differential and Special staining techniques and their applications. Aseptic techniques: principles of Physical and chemical sterilization, disinfection of equipment and materials. 2.3 Cultivation of Microbes: Nutritional requirements of microbes, Types of media, Methods of isolating pure culture, Isolation and Identification of bacteria and fungi using various biochemical tests, Methods of cultivating protozoa, photosynthetic organisms, extremophiles and chemolithotrophs. Maintenance of microbial cultures and its importance. Cultivation of viruses.	20



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3	Microbial metabolism and Biochemistry 3.1 Growth and metabolism: Bacterial growth curve, diauxic growth, metabolism of glucose by various pathways (glycolysis, HMP, ED, phosphoketolase), TCA cycle, Pathways for ethanol and lactic acid fermentation 3.2: Bioenergetics: Principles of bioenergetics, ATP generation by substrate level phosphorylation, oxidative phosphorylation, chemiosmotic hypothesis and electron transport chain in bacteria. 3.3 Fundamentals of biomolecules: Importance of carbohydrates, lipids proteins and vitamins. Structure of proteins, Classification of carbohydrates, Role of storage and membrane lipids, Role of vitamins and their deficiency, Concept of enzymes and allosteric enzymes.	20
4	Medical Microbiology, Immunology & Molecular Biology 4.1: Medical Microbiology and Virology: Diseases, Pathogens, Pathogenesis, Symptoms, Diagnosis and Treatment of Human diseases of Respiratory systems, Gastrointestinal system, CNS, Kidney and Liver and Genital system. Concept of chemotherapy, Bioavailability of drug, LD50, MIC, MBC values, Routes of drugs administration, mode of action. 4.2 Immunology: Organs of immune system, types of immunity, Antigen- Antibody reactions, Concept of Humoral and cell mediated immune response, Role of cytokines, Concept of MHC, Hypersensitivity and Autoimmunity, Immuno hematology: Blood grouping, Rh system 4.3: Genetics and Molecular Biology: DNA replication, DNA damage and repair, Transcription and Translation. Gene transfer mechanisms: Conjugation, Transformation and Transduction	20
5	Applied Microbiology 5.1: Industrial Microbiology and Biotechnology: Upstream and downstream process, Strain improvement, Concept of solid state and submerged fermentation, industrially important microbes, Role of biotechnology for synthesis of different products and strains. GMOs 5.2: Food and Dairy Microbiology: Microbes associated with food, Food spoilage, Methods of food preservation, Microbial analysis of milk Brucella ring test, Dye reduction test, Phosphatase test, Methods of pasteurization. Food safety and role of FDA. 5.3: Agricultural microbiology: Plant pathogens and their control, Biofertilizer development and importance, Role of soil microbes in Bioremediation. Soil microbiology: Plant microbial interactions, Role of Microbes in soil.	20
Total		100