

Syllabus of Paper-I and Paper-II for all Technical Officer and Technical Assistant posts

PAPER-I

Mental Ability Test:

It would include questions of both verbal and non-verbal type. The test will include questions on analogies, similarities and differences, space visualization, problem solving, analysis, judgement, decision making, visual memory, discriminating observation, relationship concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series, non-verbal series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationship, arithmetical computation and other analytical functions.

PAPER-II

A) General Awareness:

Questions will be designed to test the ability of the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of everyday observation and experience in their scientific aspects as may be expected of an educated person. The test will also include questions relating to India and its Neighboring countries especially pertaining to Sports, History, Culture, Geography, Economic scene, General Polity including Indian Constitution, and Scientific Research etc. These questions will be such that they do not require a special study of any discipline.

B) English Language:

In addition to the testing of candidates' understanding of the English Language, vocabulary, grammar, sentence structure, synonyms, antonyms and its correct usage, etc.

Mode of Examination	OMR Based or Computer Based Objective Type Multiple Choice Examination
Medium of Questions	The questions will be set both in English and Hindi except the questions on the English Language
Standard of Exam	Technical Officer: Post Graduate Diploma/ Post Graduation/ B.E/ B.Tech Level (based on the advertised qualification of the post). Technical Assistant: Diploma/ Graduation Level (based on the advertised qualification of the post).
Total No. of Questions	150
Total Time Allotted	2 hours 30 minutes

Paper-I (Time Allotted - 1 hour)

Subject	No. of Questions	Maximum Marks	Negative Marks
Mental Ability Test*	50	100 (two marks for every correct answer)	There will be no negative marks in this paper

*Mental Ability Test will be so devised so also include General Intelligence, Quantitative Aptitude, Reasoning, Problem Solving, Situational Judgement, etc.

Paper- II (Time Allotted - 30 minutes)

Subject	No. of Questions	Maximum Marks	Negative Marks
General Awareness	25	75 (three marks for every correct answer)	One negative mark for every wrong answer
English Language	25	75 (three marks for every correct answer)	One negative mark for every wrong answer

Paper-III (Time Allotted - 1 hour)

Subject	No. of Questions	Maximum Marks	Negative Marks
Concerned Subject	100	300 (three marks for every correct answer)	One negative mark for every wrong answer

Advt. No. 15/2021

Post Code T-06 (Technical Officer)

Area: Biotechnology/B.Pharm./Biochemistry/Biotechnology

Syllabus for Paper III

A. Fundamentals of Biochemistry & Molecular Biology

Carbohydrates, Proteins, Lipids, Nucleic acids, Metabolism of carbohydrates, Electron Transport Chain, Metabolism of Lipids, Metabolism of proteins, Metabolism of Nucleotides, Secondary metabolism, Enzymes

Organization of DNA into chromosomes, Mutations- molecular mechanism, DNA - Protein Interactions, DNA Replication, Transcription, Translation, Regulation of Gene expression in prokaryotes and eukaryotes, DNA- transposable elements

B. Fundamentals of Cell Biology

Cell structure and function, cell size and shape, and their organization into various types of tissues, Prokaryotic and eukaryotic cells, Cell membrane structure and function, Basic Properties of Cell Membranes, Diffusion and osmosis in biological systems, The Extracellular Matrix, Cell Junctions, Organelles Bounded by Double-Membrane, Envelopes, Nucleus, Mitochondria, Chloroplasts, Organelles bound by single membrane

C. Fundamental of Microscopy

General Principles of microscopy, Resolution, numerical aperture, Abbe's law, depth of field. Magnification vs information content, sampling, Types of light microscopy, Brightfield, phase contrast, DIC, darkfield, principle, and applications. Kohler illumination: concept, steps, impact on image quality. Sample preparation for various types of microscopy techniques.

Fluorescence and confocal Microscopy

Fluorescence fundamentals, Jablonski diagram, excitation/emission, Stokes shift, quenching, and photobleaching. Filters, dichroic mirrors, emission bands, bleed-through/crosstalk. Widefield vs confocal vs spinning disk vs TIRF (principle, pros/cons), Laser lines, objectives for fluorescence (NA, correction collar, immersion). **Confocal microscopy**, Pinhole, optical sectioning, z-stacks, 3D imaging. Typical acquisition parameters: laser power, detector gain, dwell time, frame averaging, and Nyquist sampling for z-stacks.

Biological applications and sample prep: Basics of IF/IHC: fixation (PFA vs methanol), permeabilization, blocking, primary/secondary antibody concepts, fluorophore choice for multicolor panels. Live-cell imaging constraints: phototoxicity, environmental control, media/buffer selection.

Electron microscopy: SEM and TEM: Electron optics and interaction with matter, Electron sources (thermionic, field emission), lenses, apertures. Electron-matter interactions: elastic/inelastic scattering, secondary vs backscattered electrons, X-ray generation. Working Principles of **Scanning Electron Microscope and Transmission Electron Microscopy**. Sample Preparation for Electron Microscopy. Applications of SEM and TEM.

Advt. No. 15/2021
Post Code T-07 (Technical Officer)
Area: Chemistry/Biochemistry/B.Pharm

Syllabus for Paper III

Inorganic chemistry: Atomic structure, Periodicity of elements, Chemical Bonding, Oxidation-Reduction, General Principle of Metallurgy, Acids and bases, Periodic Table, Chemistry of S and p Block elements, Noble gases, Inorganic polymers, Coordination Chemistry, Transition elements, Bioinorganic Chemistry, Coordination Chemistry.

Physical chemistry: Gaseous State, Liquid state, Solid state, Ionic equilibria, Chemical Thermodynamics, System of Variable Composition, Chemical Equilibrium, Solution and Colligative Properties, Phase Equilibria, Chemical Kinetics, Catalysis, Surface Chemistry, Conductance, Electrochemistry, Quantum chemistry, fundamentals of Spectroscopy.

Organic chemistry: Basic Organic Chemistry, Stereochemistry, geometrical isomerism, Electrophilic addition to the alkenes. Basicity, acidity, pKa; Nucleophilic substitution at saturated carbons; Chemistry of aliphatic and aromatic compound, Cycloalkanes and conformational analysis, Chemistry of halogenated hydrocarbons, alcohols, phenols, ethers and epoxide, carbonyl compounds, carboxylic acid and their derivatives, Nitrogen Containing Functional groups, Nucleic acid, amino acids, Peptides and Protein, Enzymes, Lipids.

Drug discovery: Introduction to the basics of human body, cells, organelles; Overview of drugs, drug targets; classification of drugs; Combinatorial and parallel synthesis; diversity-oriented synthesis; Drug design: Concepts of pharmacophore; bioisostere; QSAR; Basics of analytical/ instrumental techniques used on drug testing/ research, quality control methods for drugs and medicinal plant materials; Role of natural products in drug discovery; chemical classes of natural products, Regulations for allopathic and botanical drugs in India.

Advt. No. 15/2021
Post Code T-08 (Technical Officer)
Area: Zoology/B.Pharm

Syllabus for Paper III

Animal anatomy and physiology: Cell physiology, blood & circulation, gastrointestinal tract, respiratory system, nervous system, sense organs, skeletal system, urinary system, endocrine glands, reproductive system, cardiovascular system, lymphatic system.

General pharmacology: Definition, scope, source of drugs, dosage forms, routes of drug administration, mechanism of drug action, receptors, classification and drug-receptor interactions, combined effects of drugs, factors modifying drug actions, mechanism and principle of absorption, distribution, metabolism and excretion of drugs, principles of basic and clinical pharmacokinetics, pharmacogenetics, adverse drug reactions, discovery and development of new drugs (preclinical and clinical studies).

Toxicology: Definition of poison, types of poison, general principles of treatment of poisoning, study of acute, sub-acute, sub-chronic and chronic toxicity as per OECD guidelines (guidelines 420,423,425,407,408,451/452). Principal and regulatory requirements as per Schedule Y of The Drugs and Cosmetic Act, 1940.

Pathophysiology: Basic principles of cell injury and adaptation (Causes, pathogenesis and morphology of cell injury, apoptosis and necrosis), Basic mechanisms of inflammation and repair (Pathogenesis of inflammation. Chemical mediators in inflammation. Pathogenesis of chronic inflammation. Repair of wounds in the skin, factors influencing healing of wounds). Laboratory tests like Liver function tests and kidney function test to assess pathophysiological alterations in different diseases.

Immunology: Specific immunity & immune response, humoral immunity antibody response, mediators of Humoral immunity, basic, structure of antibody, antibody classes & functions, maturation of immune response, immunologic memory, antigens: specificity & Immunogenicity, natural vs. artificial antigens, soluble, cellular antigens, thymus independent antigen, adjuvant, antibody generation, detection of molecules using ELISA, RIA, Western Blot, flow cytometry and immunofluorescence microscopy.

Chromatography and mass spectrometry techniques: Principle, instrumentation and application of high pressure / performance liquid chromatography [HPLC], liquid chromatography tandem mass spectrometry (LC-MS/MS), High resolution mass spectrometry (HR-MS) for qualitative & quantitative analysis of drugs/metabolites/natural products/toxic substances in the sample including biological matrices.

Advt. No. 15/2021
Post Codes T-09, T-10, T-11,
T-12 and T-21

Advt. No. 02R/2024
Post Codes T-01, T-02, T-10,
T-14, T-15 and T-16

(Technical Assistant)

Area: Chemistry/Pharmaceutical Chemistry/Quality Assurance/Pharmaceutics/B.Pharm.

Syllabus for Paper III

Inorganic chemistry: Atomic structure, Periodicity of elements, Chemical Bonding, Oxidation-Reduction, General Principle of Metallurgy, Acids and bases, Periodic Table, Chemistry of S and p Block elements, Noble gases, Inorganic polymers, Coordination Chemistry, Transition elements, Bioinorganic Chemistry, Coordination Chemistry.

Physical chemistry: Gaseous State, Liquid state, Solid state, Ionic equilibria, Chemical Thermodynamics, System of Variable Composition, Chemical Equilibrium, Solution and Colligative Properties, Phase Equilibria, Chemical Kinetics, Catalysis, Surface Chemistry, Conductance, Electrochemistry, Quantum chemistry, fundamentals of Spectroscopy.

Organic chemistry: Basic Organic Chemistry, Stereochemistry, geometrical isomerism, Electrophilic addition to the alkenes. Basicity, acidity, pKa; Nucleophilic substitution at saturated carbons; Chemistry of aliphatic and aromatic compound, Cycloalkanes and conformational analysis, Chemistry of halogenated hydrocarbons, alcohols, phenols, ethers and epoxide, carbonyl compounds, carboxylic acid and their derivatives, Nitrogen Containing Functional groups, Nucleic acid, amino acids, Peptides and Protein, Enzymes, Lipids.

Advt. No. 15/2021
Post Code T-13

Advt. No. 02R/2024
Post Codes T-03 and T-12

(Technical Assistant)

Area: Botany/Plant Taxonomy

Syllabus for Paper III

Bryophyta General characters of Bryophyta.

Origin of Bryophyta from Algae and Pteridophytes, Vegetative reproduction in Bryophytes, Typical life-histories of Bryophyta and Classification (Proskauer, 1957), Occurrence, External and Internal Structure of Thallus and Reproduction (excluding development) of Hepaticopsida: Riccia, and Funaria. Unifying features of archegoniates, Transition to land habit, Alternation of generations.

Pteridophytes

General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to 11 family), morphology, anatomy and reproduction of Selaginella. (Developmental details not included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.

Gymnosperms General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not included). Ecological and economical importance.

Ecological factors: soil origin, formation, composition, soil profile. Water, light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Plant communities Characters; Ecotone and edge effect; Succession; Processes and types. Ecosystem Structure; energy flow trophic organisation; Ecological pyramids production and productivity; Biogeochemical cycling.

Phytogeography Principle biogeographical zones; Endemism.

Identification, Classification, Nomenclature in plant taxonomy, Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access. Taxonomic evidences from palynology, cytology, phytochemistry and molecular data. Taxonomic hierarchy: Ranks, categories and taxonomic groups. Botanical nomenclature: Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.

Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series). Biometrics, numerical taxonomy and cladistics, Characters; variations; OTUS, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences)

Meristematic and permanent tissues, Root and shoot apical meristems; Simple and complex tissues. Structure of dicot and monocot root stem and leaf. Secondary Growth, Vascular cambium - structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood). Adaptive and protective

systems, Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes. Structural organization of flower, Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac. Pollination and fertilization, Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms. Embryo and endosperm, Endosperm types, structure and functions; Dicot and monocot embryo; Embryoendosperm relationship. Apomixis and polyembryony, Definition, types and practical applications.

Enzymes Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition. Nitrogen metabolism Biological nitrogen fixation; Nitrate and ammonia assimilation. Plant growth regulators, Plant response to light and temperature, Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization

Chromosome organization, DNA structure, DNA extraction, PCR principle and application, PCR and non-PCR based techniques and their application, DNA fingerprinting and barcoding.

Advt. No. 15/2021
Post Codes T-14, T-17 and T-18

Advt. No. 02R/2024
Post Codes T-04, T-06 and T-07

(Technical Assistant)

Area: Zoology

Syllabus for Paper III

1. Non-Chordates: Protista to Pseudocoelomates: Protista, Parazoa and Metazoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nematelminthes, Introduction to Coelomates, Annelida, Arthropoda, Onychophora, Mollusca, Echinodermata
2. Principles of Ecology: Introduction to Ecology, Population, Community, Ecosystem, Applied Ecology.
3. Cell Biology: Overview of Cells, Plasma Membrane, Endomembrane System, Mitochondria and Peroxisomes, Cytoskeleton, Nucleus, Cell Division, Cell Signaling.
4. Diversity of Chordates: Introduction to Chordates, Protochordata, Origin of Chordata, Agnatha, Pisces, Amphibia, Reptilia, Aves, Mammalia.
5. Animal Physiology: Controlling And Coordinating Systems: Tissues, Bone and Cartilage, Nervous System, Muscle, Reproductive System, Endocrine System.
6. Fundamentals of Biochemistry: Carbohydrates, Lipids, Proteins, Nucleic Acids, Enzymes. Overview of Metabolism, Carbohydrate Metabolism, Lipid Metabolism, Protein Metabolism, Oxidative Phosphorylation.
7. Comparative Anatomy of Vertebrates: Integumentary System, Skeletal System, Digestive System, Respiratory System, Circulatory System, Urinogenital System, Nervous System, Sense Organs.
8. Animal Physiology: Life Sustaining Systems: Physiology of Digestion, Physiology of Respiration, Renal Physiology, Components of blood and their functions, Physiology of Heart.
9. Molecular Biology: Nucleic Acids, DNA Replication, Transcription, Translation, Post Transcriptional Modifications and Processing of Eukaryotic RNA, Gene Regulation, DNA Repair Mechanisms, Regulatory RNAs.
10. Principles of Genetics: Mendelian Genetics and its Extension, Linkage, Crossing Over and Chromosomal Mapping, Mutations, Sex Determination, Extra-chromosomal Inheritance, Polygenic Inheritance, Recombination in Bacteria and Viruses, Transposable Genetic Elements.
11. Developmental Biology: Introduction-Historical perspective and basic concepts, Early Embryonic Development, Late Embryonic Development, Post Embryonic Development, Implications of Developmental Biology.
12. Evolutionary Biology: Life's Beginnings-Chemogeny, RNA world, Biogeny, Historical review of evolutionary concept- Lamarckism, Darwinism, Neo-Darwinism, Evidences of Evolution, Sources of variations- Heritable variations, Population genetics, Product of evolution, Extinctions, Origin and evolution of man, Phylogenetic trees.

Advt. No. 15/2021
Post Code T-15

Advt. No. 02R/2024
Post Code T-05

(Technical Assistant)

Area: Microbiology/Biotechnology

Syllabus for Paper III

Introduction to Microbiology and Microbial Diversity: Diversity of Microbial World-Systems of classification & general characteristics, an overview of Scope of Microbiology.

Bacteriology: Cell Organization, Bacteriological techniques, Microscopy, Growth and nutrition, Reproduction Bacteria, Bacterial Systematics, Important archaeal and eubacterial groups.

Biochemistry: Bioenergetics, Proteins, DNA, RNA, Carbohydrates, Lipids, Enzymes, Vitamins.

Microbial Physiology and Metabolism: Microbial growth and effect of Environment on Microbial Growth. Nutrient uptake and Transport, Chemoheterotrophic Metabolism-Aerobic Respiration, Chemoheterotrophic Metabolism- Anaerobic respiration and fermentation, Chemolithotrophic and Phototrophic Metabolism, Nitrogen Metabolism - an overview. Isolation, characterization and preservation of microbes (short term and long term preservation).

Cell Biology: Structure and organization of Cell, Nucleus, Protein Sorting and Transport, Cell Signalling, Cell Cycle, Cell Death and Cell Renewal.

Molecular Biology: Structures of DNA and RNA / Genetic Material, Replication of DNA (Prokaryotes and Eukaryotes), Transcription in Prokaryotes and Eukaryotes, Post-Transcriptional Processing, Translation (Prokaryotes and Eukaryotes), Regulation of gene expression in Prokaryotes and Eukaryotes.

Food and Dairy Microbiology: Foods as a substrate for microorganisms, Microbial spoilage of various foods, Principles and methods of food preservation, Fermented foods, Food borne diseases.

Industrial Microbiology: Introduction to industrial microbiology, Isolation of industrially important microbial strains and fermentation media, Types of fermentation processes, types of bioreactors and measurement fermentation parameters, Down-stream processing, Microbial production of industrial products like proteins/peptides, antibiotics, vitamins etc. (micro-organisms involved, media, fermentation conditions, downstream processing and uses), Enzymes immobilization.

Recombinant DNA Technology and Cloning Vectors: Definition and Properties of Plasmid vectors, Transformation of DNA, DNA Amplification and DNA sequencing: traditional and automated sequencing, Southern- and Northern- blotting techniques, dot blot, DNA microarray, SDS-PAGE and Western blotting. Construction and Screening of Genomic and cDNA libraries.

Biochemistry & Metabolism: Introduction to Biochemistry, Lipids: Structure and functions - Classification, Carbohydrates Metabolism, Bioenergetics and thermodynamics

Bioprocess Technology: Introduction to bioprocess technology - Techniques and basic principle components, Introduction to oxygen requirement in bioprocess, Introduction to downstream processing.

Bio-Analytical Tools: Microscopy, Spectroscopy, Chromatography, Electrophoresis, Molecular Techniques.

Advt. No. 15/2021
Post Code T-19

Advt. No. 02R/2024
Post Code T-08

(Technical Assistant)
Area: Electrical Engineering

Syllabus for Paper III

ELECTRIC CIRCUITS: Single Phase A.C Series/parallel Circuits, Three Phase Circuits, principles of circuit analysis and troubleshoot problems related to single/three phase A.C circuits, Network Reduction and Principles of Circuit Analysis, Network Theorems, Knowledge of electric circuits laboratory

ELECTRICAL AND ELECTRONIC MEASUREMENTS: Fundamentals of Measurements, Analog and digital instruments, Measurement of voltage, current, Electric Power and Electric Energy, CT and PT, Circuit Parameter Measurement, Measure AC and DC quantities in a working circuit, Use of measuring instrument in different electrical applications, Single and three phase electronic energy meter, Earth tester, Digital Multimeter; L-C-R meter, Measurement of inductance/capacitance/Resistance Frequency meter (ferromagnetic and Weston type), Phase sequence indicator, power factor meter (single phase and three phase dynamometer type), Synchro scope, Tri-vector meter

ELECTRIC MOTORS AND TRANSFORMERS: Introduction and operating principles of electric motors and transformers, DC Generators, AC/DC Motor, Single/Three Phase Transformers, Special Purpose Transformers: pulse and Isolation transformer, overheating due to non-linear loads and harmonics, regulation and efficiency of transformers, Single/Three Phase Induction Motor, Starters, Speed control methods, Torque-speed characteristics, Alternators, BLDC, Permanent Magnet Synchronous Motors, stepper motors, AC and DC servomotors.

FUNDAMENTALS OF POWER ELECTRONICS: Power Electronic Devices, Thyristor, Protection circuits: over-voltage, over-current, Snubber, Crowbar Phase Controlled Rectifiers, Industrial Control Circuits, SMPS, UPS

ELECTRIC POWER TRANSMISSION AND DISTRIBUTION: Basics of Transmission and Distribution. Classification of transmission lines, Transmission Line Parameters and Performance, Concepts of R, L and C of line parameters and types of lines, power factor, vector diagram, AC distribution: Components classification, Feeder and distributor, distribution schemes: radial, ring, and grid, layout, advantages, disadvantages and applications, Distribution Sub-Station, Symbols and functions, Overhead Conductors, Line supports, Line Insulators, Underground Cables

ELECTRICAL ESTIMATION, TESTING, COMMISSIONING AND PROTECTION: Estimation and Costing, Electrical Safety and Insulation, Installation and Erection static and rotating electrical machinery, transformer, Testing and Commissioning of electrical equipment, Concept of maintenance and its types, Necessity, functions of protective system, Circuit Interruption Devices, Protective Relays

Advt. No. 15/2021
Post Code T-20

Advt. No. 02R/2024
Post Codes T-09 and T-18

(Technical Assistant)
Area: Computer Engineering

Syllabus for Paper III

1. Computer Architecture and Organization: Computer Architecture Stored program concept, Number Representation, Basic Computer Organization and Design, Central Processing Unit, Memory Organization, Input-Output Organization.
2. Computer Application & Programming: Computer Architecture, Number System and codes, Operating System, Computer Network and the Internet, C & C++ programming.
3. Computer Hardware and Networking: Computer System Layout, Installation and configuration of Secondary memory and BIOS, Installation of different devices, Trouble shooting basics, OS installation, Basics of Networking, LAN Configuration, Security fundamentals.
4. Data Structure: Elementary Data Organization, Preliminaries:Mathematical notation and function, String Processing, Arrays, Records and Pointers, Linked Lists, Stacks, Queues, Recursion, Trees, Graphs and Their Application, Sorting and searching, File Organization.
5. Digital Electronics: Boolean Algebra and Logic Gates, Combinational Digital System, Flip Flops, Registers &Counters, Memory Devices, Display Device.
6. Microprocessor and Interfacing:Specific features of Microprocessor, Internal architecture of a microprocessor, Addressing modes and Instruction execution, Interfacing of Memory and I/O devices, Assembly language Programming, Peripheral chips and their interfacing, PC interfacing and Intel 386 and 486 processors.
7. System Programming: Assembly Language, Macros, Assemblers, Macro Assembler, Loaders, Compiler Construction.
8. Computer Communication & Networking: Uses of Computer Network, The Physical Layer, The Medium Access Sub layer, The Data Link Layer, The Network Layer, The Transport Layer, The Session Layer, The Presentation Layer, The Application Layer, Concepts of Internet and www, HTML, TCP/IP.
9. Database Management Systems: Database System Environment, Database system concept and Application, E-R diagram, SQL, Functional Dependencies and Normalization for Relational Database, Transaction processing concepts, Concurrency Control Techniques, Security and Integrity, Distributed databases.
10. Internet & Web Technology: Internet Fundamentals, TCP/IP internet layering model, Internet Application and Services, E-Commerce, Web Publishing and Browsing, Interactivity Tools.

11. JAVA Programming: Object oriented methodology, Java, Implementation of java features, Package, Java I/O, Exception Handling, Multi-Threaded Programming, Network Programming, GUI Programming, Database connectivity with JDBC.
12. Operating System: Processes, Process Scheduling Algorithm, Memory Management, File System, Input/output Principles of I/O Hardware & Software, Device Management, Deadlocks, Distributed OS.
13. Visual Programming: .NET framework, MSIL, CLR, CLS, Name Spaces, Assemblies, Common Language, VB, NET Language features, Introduction to Windows Forms, Introduction to ADO.NET, Data types and Base Class Libraries, Object Oriented Programming with VB.NET, Visual Inheritance Apply Inheritance Techniques to Forms, ASP.NET.
14. Recent Technologies & Trends: Virtualization, Cloud Computing & Cloud Services, PaaS, IaaS, SaaS, IoT, High Performance Computing, Artificial Intelligence & Machine Learning: Fundamentals, Big Data, Data Visualization, Fundamentals of Data Center Ecosystem.

Advt. No. 02R/2024
Post Code T-11 (Technical Assistant)
Area: Agriculture

Syllabus for Paper III

1. Agronomy: Introductory Agriculture and Principles of Agronomy, Field Crops-I (Kharif), Field Crops- II (Rabi), Practical Crop Production-I (Kharif Crops), Weed Management, Practical Crop Production II (Rabi Crops), Water Management Including Micro Irrigation, Organic Farming, Farming Systems and Sustainable Agriculture.
2. Plant Breeding and Genetics: Economic Botany, Principles of Genetics, Principles of Plant Breeding, Breeding of Field/Horticulture Crops, Principles of Seed Technology, Principles of Plant Biotechnology.
3. Soil Science and Agricultural Chemistry: Introduction to Soil Science, Soil Chemistry, Soil Fertility and Nutrient Management, Manures, Fertilizers and Agro-Chemicals.
4. Entomology: Insect Morphology and Systematics, Insect Ecology and Integrated Pest Management including Beneficial Insects, Pests of Field Crops and Stored Grain and their Management, Pests of Horticultural Crops and their Management.
5. Agricultural Economics: Principles of Agricultural Economics, Agricultural Marketing, Trade and Prices, Agricultural Finance and Co-Operation, Fundamentals of Agribusiness Business Management (Including Project Development, Appraisal and Monitoring), Production Economics and Farm Management.
6. Agricultural Engineering: Fundamentals of Soil, Water and Conservation Engineering, Farm Power and Machinery, Protected Cultivation and Post Harvest Technology, Renewable Energy.
7. Agricultural Meteorology: Earth's atmosphere, Composition, division of atmosphere. Sun-earth relationship, season, weather and climate. Pressure and wind systems, cyclone and anticyclone. Condensation, precipitation, clouds, Indian monsoon. Meaning and scope of Agricultural meteorology. Importance of weather and climate in agricultural production. Microclimate, crop-weather-pest disease relationship. Climatic hazards in crop production Droughts and frost. Heat unit concept and its application in India. Potential evapotranspiration and its estimation. Weather forecasting. Agro-climatic zones of India.
8. Plant Pathology: Introductory Plant Pathology, Principles of Plant Pathology, Diseases of Field Crops and their Management, Introductory Nematology, Diseases of Horticultural Crops and their Management.
9. Horticulture: Production Technology of Fruit Crops, Production Technology of Vegetables and Flowers, Production Technology of Spices, Aromatic, Medicinal and Plantation Crops, Post Harvest Management and Value Addition of Fruits and Vegetables.
10. Agricultural Extension: Dimensions of Agricultural Extension, Fundamentals of Rural Sociology and Educational Psychology, Fundamentals of Rural Sociology and Educational Psychology, Entrepreneurship Development.

11. Biochemistry/Physiology Microbiology/Environmental Sciences/ Bio-Mathematics: Bio-Mathematics, Agricultural Microbiology, Crop Physiology-I, Crop Physiology-II, Biochemistry, Environmental Science.
12. Statistics and Computer Application: Introduction to Computer Applications, Agricultural Statistics.
13. Animal Production: Livestock Production and Management, Dairy Cattle & Buffalo Production & Management.

Advt. No. 02R/2024
Post Code T-13 (Technical Assistant)
Area: Zoology/Biotechnology/Microbiology

Syllabus for Paper III

1. Cell Biology: Overview of Cells, Plasma Membrane, Endomembrane System, Mitochondria and Peroxisomes, Cytoskeleton, Nucleus, Cell Division, Cell Signaling.
2. Animal Physiology: Controlling And Coordinating Systems: Tissues, Bone and Cartilage, Nervous System, Muscle, Reproductive System, Endocrine System.
3. Fundamentals of Biochemistry: Carbohydrates, Lipids, Proteins, Nucleic Acids, Enzymes. Overview of Metabolism, Carbohydrate Metabolism, Lipid Metabolism, Protein Metabolism, Oxidative Phosphorylation.
4. Animal Physiology: Life Sustaining Systems: Physiology of Digestion, Physiology of Respiration, Renal Physiology, Components of blood and their functions, Physiology of Heart.
5. Molecular Biology: Nucleic Acids, DNA Replication, Transcription, Translation, Post Transcriptional Modifications and Processing of Eukaryotic RNA, Gene Regulation, DNA Repair Mechanisms, Regulatory RNAs.
6. Principles of Genetics: Mendelian Genetics and its Extension, Linkage, Crossing Over and Chromosomal Mapping, Mutations, Sex Determination, Extra-chromosomal Inheritance, Polygenic Inheritance, Recombination in Bacteria and Viruses, Transposable Genetic Elements.
7. General Microbiology: Functional morphology of the microbial cell, Microbial nutrition, Microbial growth, Physical and chemical control of microorganisms.
8. Bioprocess Technology: Introduction to bioprocess technology - Techniques and basic principle components, Introduction to oxygen requirement in bioprocess, Introduction to downstream processing.
9. Recombinant DNA Technology: Molecular tools and applications - restriction enzymes, ligases, polymerases, alkaline phosphate, Restriction and modification system, restriction mapping, Random and site-directed mutagenesis, Genetic engineering in plants.
10. Bio-Analytical Tools: Microscopy, Spectroscopy, Chromatography, Electrophoresis, Molecular Techniques.
11. Genomics & Proteomics: Introduction to Genomics, DNA sequencing methods, Managing and Distributing Genome Data, Introduction to protein structure, Chemical properties of proteins, Introduction to protein structure, Chemical properties of proteins, introduction to proteomics, analysis of proteomes.