

ಸಿಎಸ್ಐಆರ್ - ಕೇಂದ್ರೀಯ ಅಹಾರ ತಂತ್ರಜ್ಞಾನ ಸಂಶೋಧನಾಲಯ, ಮೈಸೂರು - 570 020, ಭಾರತ सीएसआईआर – केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत CSIR - Central Food Technological Research Institute, Mysuru - 570 020, India

FT/15(1190)/2025/E-I

25th June, 2025

NOTIFICATION

Sub:Syllabus for the post of Technical Assistant- reg.Ref:CSIR-CFTRI Advertisement No. Rec.03/2025

Kind attention of the candidates is invited to the advertisement cited under reference above. This is for the information of all the candidates, who have applied for various posts in response to the above advertisement that the syllabus for **Trade Test and Written Test (Paper-III)** for various post(s) of Technical Assistant will be as follows:

Please note that the Provisional list of shortlisted candidates to appear for the Trade test, the list of candidates not recommended, along with the reasons will be notified soon on the CFTRI Website https://cftri.res.in. Those who are Provisionally shortlisted will only be allowed to appear for the Trade test and will be given the option to download the Admit card.

CANDIDATES ARE ADVISED TO CHECK THEIR REGISTERED EMAILS AS WELL AS CSIR-CFTRI WEBSITE https://cftri.res.in REGULARLY FOR THE UPDATES. NO INTERIM OR TELEPHONIC ENQUIRY OR CORRESPONDENCE WILL BE ATTENDED TO.

Sd/-Controller of Administration



रै अरुरांध अर्थ - इंट दि के के बाद प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत सीएसआईआर – केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत Future CSIR - Central Food Technological Research Institute, Mysuru - 570 020, India

Post Code: TA-01

Area: Mechanical Engineering

Engineering Drawing: convention of lines, scales, Dimensioning, Geometrical constructions, first angle & third angle projections and their symbols, Projection of points, projection of lines, orthographic projection, isometric projection, 2D/3D models, Thread profiles, nuts, bolts, studs, washer, locking arrangements

Materials for Engineering: Classification of Engineering Material, Properties of metals-Physicalmechanical-Thermal properties, Types of cast iron-White-grey-Nodular malleable, Broad classification of steels, BIS- ASME coding of plain, alloy steel and cast iron, Copper, Aluminium, Nickel and their alloys, Chemical composition & Properties, Bearing materials, Polymeric materials, Ceramics, Composite materials, Bio material, Nano material, smart material, Iron–carbon equilibrium diagram, Heat treatment processes, annealing, normalizing, tempering, hardening and case hardening, surface treatment

Mechanics of materials: Types of Forces, Resolution of forces, Types of loads (Tensile, Compression, Shear, Impact, Young's modulus, stress strain diagram, Beams, shear force and bending moment diagrams, finite element method introduction

Fundamentals of Electrical and Electronics engineering: Electrical symbol and electrical safety, Electrical earthing, Electrical current, voltage, emf, potential difference, resistance, SI units, AC, DC supply systems, AC Sinewave, meters used to measure different electrical quantities, open circuit, closed circuit, short circuit, single phase and three phase supply, fuses, relay, types of wires, cables, transformer, induction motor, DOL, Star delta starters, battery, UPS, Conductors, insulators, semiconductors, resistor color code, diode, rectifier, transistor, sensors, actuators

Machine tool technology: Safety signs in machine shop, types of fire extinguishers, Lubrication and Lubricant, Traditional & Non Traditional material removal process, cutting tool types and specifications, grinding-abrasives, Surface Texture roughness symbols, Jigs and fixtures, Lathe, Lathe Operations: Facing, Plain Turning, Step Turning, Taper Turning, Knurling, Thread cutting, chamfering, radius turning, Milling, milling cutters and nomenclature, up milling and down milling, plain milling, key way and v- slot operation, Gear cutting, indexing method, Drilling, Drill bit, reamer, die and taps, Drill bit nomenclature, Transmission of power, cams, mechanical vibrations, governors, bearings, types of drives-belt, chain, rope, velocity ratio, gears and gear trains, Power tools, Power plane, Circular saw, Sander, Chain saw, Angle grinder Drilling machine

CNC Programming and machining: Introduction to CNC machines, Construction features of CNC machine- Machine Structure, bed, spindle motor and drive, axes motor and ball screws, Guide ways, LM guides, console, control switches, coolant system, hydraulic system, Cutting tool materials, cutting tool geometry, index able inserts, tool length, tool nose radius and tool wear compensation, programming sequence and format-absolute and incremental system, G codes and M codes, Linear interpolation and circular interpolation, metal cutting parameters, part program for facing, turning, step turning and taper turning, CNC milling and drilling programs, mirroring and subroutines, introduction to CAM

Product design and development: stages of product development, need and feasibility study, material selection and process, prototype and product life cycle, Aesthetic and Ergonomic design, torsion of shaft, springs classification and design of helical spring, muff coupling, flange coupling, knuckle joint, 3D printing, fused deposition modelling machine, elements of costs, depreciation, indirect expenses, machining time estimation, welding and fabrication time estimation

Industrial Automation: Need and benefits of industrial automation, types of automation system-relay and PLC logic, I/O Modules, Input devices-mechanical, proximity switches, photo electric sensors, temperature sensors, encoders, position and displacement sensors, strain gauge, pressure gauges, DC motors, synchronous motor, servo motor, stepper motor, PLC programming, logic gates, timer functions, counter functions, embedded systems, HMI Concept, SCADA



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Manufacturing processes: Foundry, pattern and types, molding, molding sand, Core & Core prints-Gates-Runner-Riser, Defects in casting, metal forming process, hand forging and power forging, power hammer, sheet metal, standard gauges of sheet, sheet metal operations, Trammels, Wire gauge, Snips, Hammer, Stacks, Soldering, Soldering iron, Brazing, sheet metal developments, wood work joints: Bridle joint, Dovetail joint (halved), Cross joint (halved), Mortise and Tenon joint, Tee (halved) joint, Commonly used workshop tools, Bench vise, pipe vise, Hammers [Ball peen hammer, Cross & straight peen hammers, Double faced hammer, Soft hammer (mallet)], Flat chisel, Cross cut chisel, Diamond pointed chisel, Single cut & double cut files, Flat file, Square file, Triangular file, Round and half round file, Hand saw, Callipers (outside and inside), Hermaphrodite calliper, Dividers, Surface plate, Scriber, Punches, Vblock, Angle plate, Try square, Bevel square, Combination set, Marking gauge, Mortise gauge, Planes (jack plane, metal plane), Ratchet brace, Wheel brace, Welding Electrode holder, Transformer, Electrode, Face and head shield, Goggle, Chipping hammer, Wire brush, Hand gloves, Types of welding joints (Lap, Butt, Corner, T-joint), Introduction to rolling, types of rolling mills, Introduction to extrusion and drawing process, basic concepts of measurements, precision, accuracy, linear and angular measurements, error in measurements, measurement of force, power and flow, measurement of geometrical dimensions of "V thread" using Vernier & thread gauge, measurement of diameter of wire using micrometer, measurement of angle of "V block" / taper shank of drill using bevel protractor

Advanced manufacturing technologies: Ultrasonic machining process, Electro chemical machining, types of electrolytes, chemical machining, etchants, electrical discharge machining (EDM), Dielectric fluid, metal removing rate, wire cut EDM, Electron beam machining (EBM), laser beam machining, Additive manufacturing (AM), additive manufacturing materials, Binding mechanism, Robots in Advanced Manufacturing, industrial robots, types of robots, Concepts of IIOT (Industry Internet of Things)

Fluid power engineering: Properties of fluids, Pascal law, equation of continuity, Bernoulli's equation, Venturi meter, Pitot tube, Orifice meter, Flow through Pipes-Major & minor losses, Chezy's and Darcy's formulae, classification of pumps, centrifugal and mono block pumps, submersible and reciprocating pump, Hydraulic Turbine-Impulse turbine, basic components of Fluid Power Systems with Symbols, accumulators, Actuators-single and double acting air cylinders, air motors

Heating ventilation and air conditioning (HVAC): Thermal Principles Concepts of Heat, Sensible Heat, Latent Heat Temperature, Temperature Scale Work, Power, Energy, Enthalpy, Entropy, Specific Heat, Internal energy, conduction, convection and radiation, Heat exchangers, Perfect Gas – Gas Laws- Charles law, Boyles law, Laws of Thermodynamics, P-V and T-S Diagram, Psychrometry, Dry Air, Moist Air, Saturated Air, Degree of Saturation, Dry Bulb, Temperature, Wet Bulb Temperature, Humidity, Relative Humidity, Humidity Ratio, Human comfort, indoor air quality, solar angles, thermal insulation, split AC, variable refrigerant flow, Centralized Air Conditioning System, Refrigeration cycle, components of refrigerant, chilled water cycle, components of chilled water cycle, air distribution system, duct, air handling unit, Heating cycle, boiler, heat pump, Fan, Fan law, Duct material, shape of duct, Duct Designing method- Velocity Reduction method, Equal friction Method, Static Regain Method, Pressure in Ducts- Static, Pressure, Dynamic or Velocity, pressure, Total pressure, Distribution System Plans and Symbols- Positive pressure supply, Negative pressure return, green buildings

Environmental sustainability: Ecosystem, global warming, greenhouse effect, ozone depletion, air pollution, air pollutant and types, cyclone separator, electro static precipitator, noise pollution, noise pollution measurement, water and soil pollution, water conservation, rain water harvesting, Renewable sources of Energy, E-waste, ISO-14001 & Environmental management



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Post Code: TA-02

Area: Computer Science & Engineering

Computer Architecture & Organization: Computer Architecture Stored Program concept, Number Representation (bits & bytes), Basic Computer Organization & Design, CPU – Components, Memory Organization – Primary, Secondary Memory, RAM/ ROM, Input -Output Organization – I/O devices.

Computer Hardware and Maintenance: Computer System layout, Installation and Configuration of Secondary Memory and BIOS, I/O devices and Interfaces, Installation of Different Devices, Troubleshooting of devices, Power supplies, Motherboard, Chipsets, Memory, Troubleshooting Basics including peripherals, OS Installation: Windows & Linux, File Systems, Secondary Storages, Data Backup, Servers, E-wastes.

Computer Networks & Security: Basics of networking, OSI model & Network Layers, TCP/IP Networking model, Network topologies, Active & Passive Network Components, Peer-to-peer (P2P) networking, Installation of different networks like P2P & client-server models, Sharing of resources, LAN configuration-VLANS, Modems, Switches, Routers, Wi-Fi, IPv4, IPv6, Routing, Troubleshooting of Network issues; Security fundamentals – Cyber Security, Firewall, Antivirus, Phishing, Spamming, Malware, Man in the middle attacks, DoS & DDOS attacks.

Database Management Systems: Database Environment, Database System Concept and Application – database types, schema, subschema, tables, views, functions, stored procedures, constraints, schedulers, E-R diagram, SQL – query types, query statements, Functional Dependencies and Normalization for relational database, transaction processing concepts, concurrency control techniques, Security and Integrity, Distributed database.

Internet & web technology: Internet fundamentals, TCP/ IP internet layering model, internet application and services – websites, web servers, web technologies, browsers, URL, scripting languages, XML, SSL certification, client-server paradigm, CSS, HTML, e-Commerce, web publishing and browsing, Interactivity tools.

Operating System: Processes, Process scheduling algorithms, Process Synchronization, Batch Processing, Time Sharing, Memory Management – Virtual Memory, Paging, Swapping, File System – Allocation methods, Space Management, Input/output principals of I/O hardware & software, Device Management, Deadlocks – Handling deadlocks, resource allocation, deadlock prevention algorithms, Distributed OS, Configuration of DHCP, DNS, File Server, FTP & Web Servers, Fundamentals of Linux.

Data structures: Elementary data organization, Preliminaries: Mathematical notation and function, string processing, Arrays, Record and pointes, Linked lists, stacks, Queues, Recursion, Trees – nodes, leaves, binary trees, Graphs – Graph Types and their application, Sorting and Searching – Sorting and Searching Algorithms, File organization – File types, orientation.

Computer Programming: Programming Languages & Generations, Flow Charts, Algorithms, Data Types, Basics of C, Structures, Pointers, Functions, Object Oriented Programming: Concepts, C++, Java, File Handling, Data Base Connectivity.

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.



रैक्रिये सीएसआईआर – केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत Galaria CSIR - Central Food Technological Research Institute, Mysuru - 570 020, India

Post Code: TA-03

Area: Electronics Engineering

Electrical circuits: Basic DC Circuits (Ohms law, KCL, KVL), voltage and current division in series and parallel circuits, mesh analysis and node analysis, network theorems (The Venin's, Norton, MPT, superposition theorems, statement and simple problems), basic ac circuits, average and RMS values, RL, RC, RLC series and parallel circuits, resonance), three phase circuits.

Electronic devices and circuits: Introduction to Semiconductors, BJT (basic configurations and biasing), FET, UJT (construction and working principle), Zener diode, rectifier circuits, opto-electronic devices (LED photo diode, opto-coupler), concept of feedback, transistor amplifiers types, oscillators, special semiconducting devices (SCR, DIAC, and TRIAC), Filters (different types), wave shaping circuits (clipping, clamping, voltage multipliers, multivibrator and Schmitt trigger using transistor).

Linear ICs and OPAMPs: Ideal Op-Amp characteristics, Op-Amp parameters, slew rate, virtual ground. Inverting, summing, non-inverting, voltage follower, differentiator, integrator, trans impedance and instrumentation amplifiers and its problems, comparator, zero crossing detector, waveform generation (Schmitt-trigger only) - RC low pass active filter. Analog to digital conversion using ramp method, successive approximation, dual slope method, specifications of converter, special function ICs (IC 555, IC 565, IC 566), IC voltage regulators (78XX), negative voltage regulators (79xx).

Digital Electronics: Number systems: Decimal - binary - octal - hexadecimal, BCD - conversion from one number system to other, Boolean algebra - basic laws and Demorgan's theorems, universal gates: realization of basic logic gates using universal gates NAND and NOR, tristate buffer circuit, problems using 2, 3 and 4 variables, Boolean expression for output simplification of Boolean expression using Karnaugh map (upto 4 variable) constructing logic circuits for the Boolean expressions, arithmetic operations binary addition-binary subtraction- 1'scompliment and 2's compliment - signed binary numbers, arithmetic circuits half adder-full adder-half sub-tractor-full subtractor, combinational circuits (mux, demux, decoder, encoder, decimal to BCD), sequential circuits (D,T,RS,JK flip flops) counters (synchronous and asynchronous, Logical Design using Verilog).

Microcontrollers and Microprocessors: Architecture of 8051 microcontrollers, 8051 instruction set and programming, peripherals of 8051 (I/O Ports, timer/counter, Serial Communication), interfacing techniques (8255, ADC, DAC, stepper motor). Introduction to microprocessor, 8085/8086 microprocessor architecture, instruction set and programming, memory and I/O interfacing.

Industrial Electronics: Power devices: MOSFET, IGBT construction and principle of working, VI characteristics and applications, Trigger circuits: SCR gate triggering, DC & AC triggering, UJT triggering, converters and choppers (qualitative treatment only), inverters applications, basics of programmable logic controllers (PLC).

Instrumentation & measurements: Measurements, performance characteristics of measuring instruments, signal and response of measurement systems, sensors and transducers, pneumatic transducer, signal conversion, temperature measurements, pressure measurements, level measurements, flow measurements, tele metering, measurement of resistance, potentiometer, ac bridge measurement of current and voltage, measurement of power, measurement of energy.

Industrial Automation and Robotics: Introduction to industrial automation and data acquisition, control generation, automatic control, PID control, feedforward control, ration control, branching operations, sequential control: Sequence control, PLC, RLL, control systems, hydraulic, pneumatic, variable speed drives, CNC machines, basic components of a Robot, introduction to Robot End Effectors, Types of End Effectors, Robot Kinematics: Introduction to positional analysis, finite rotation and transition, forward and inverse kinematics, trajectory planning, velocity and static force analysis.

Communication Engineering: Networks, filters, antenna and propagation, amplitude modulation, frequency modulation, pulse modulation techniques, audio and video systems, Wireless Communications. Data Communication and Networking.



C Programming: Introduction to C, I/O statements, c-operators- (arithmetic, logical and relational), problems on bitwise operators, decision making (if, if else, nested if statements), branching and looping statements (while, do while ,for loop, goto, break statements), Functions (call by value, call by reference, recursive functions, etc.), Arrays (definition and declaration of one, two dimensional arrays), pointers and structures (array of structures, structure within the structures, etc.) union (initialization), Files (file opening, reading, writing, closing), Embedded C programming.

Industrial Internet of Things (IIoT): Industrial Revolutions 1,2 & 3. Globalization and Emerging issues. Fourth Industrial Revolution. Industry 4.0 concepts, benefits. Applications of Industry 4.0 - video demonstration. Difference between IoT and IIoT, IoT node. Globalization and Emerging Issues of IIoT. Interoperability, Identification, localization, Communication, Software Defined Assets. IIoT application in various sectors/industries.

Printed Circuit Board (PCB) Technology: Requirements of a PCB, Copper Clad Laminates (CCL), Layout Planning, Artwork, Design Rules, Film Master Preparation, Pattern Transfer, Computer in PCB Technology.

Drone Technologies: Different types of unmanned vehicles. basic fundamentals of flight, Introduction, History, UV types - UGV, UAV, USV, UUWV, Drones in India, Applications, Future scope;

E-Mobility: Introduction, Benefits & Future Technologies. Comparison between Internal Combustion Engines (ICE) vehicles & E-Vehicles (EV); Electric Vehicle - Overview, Types, EV Terminologies; Calculating the rolling resistance, Calculating the grade resistance, Calculate the Aerodynamic drag, Calculating the Acceleration Force, Calculate the maximum speed of vehicle; EV Power train - Components, Block diagram & it's working principles.



• ஃಎಸ್ಐಆರ್ - ಕೇಂದ್ರೀಯ ಅಹಾರ ತಂತ್ರಜ್ಞಾನ ಸಂಶೋಧನಾಲಯ, ಮೈಸೂರು - 570 020, ಭಾರತ सीएसआईआर – केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत CSIR - Central Food Technological Research Institute, Mysuru - 570 020, India

Post Code: TA-04

Area: Food Science/Food Technology

Food Composition and Nutrition

Moisture in foods and methods of moisture determination. Carbohydrate, protein, and fat content in foods and changes during processing. Vitamins and minerals in foods and changes during processing Plant pigments in foods and changes during processing Energy value of foods, energy requirement. Nutritional aspects of carbohydrates, proteins, and fats. Nutritional significance of vitamins and minerals and deficiency diseases. Recommended Daily Allowances for nutrients and balanced diets.

Food Microbiology and safety

Microorganisms: Types and growth requirements

Physical, chemical and biological factors influencing the destruction of microorganisms

Microorganisms in food products: Sources and prevention of contamination.

Microbiology of various foods: water, milk and milk products; cereals and cereal products; fruits, vegetables and their products; meat and meat products; fish and fish products; poultry and eggs

Food Processing and packaging

Basic principles of food processing

Causes for food spoilage.

Refrigerated, Modified and controlled atmosphere storage

Food preservation techniques: Freezing, Drying and dehydration, use of salt and sugars, Chemical preservation, Food irradiation, Hurdle technology

Processing of fruits and vegetables, cereals, pulses, millets, oilseeds, meat, fish, poultry and dairy products. Package materials and functions: Papers and paper-boards, plastic films, aluminium foils, metallized films, bags, pouches, wraps, corrugated fibre-board boxes, wooden containers, sacks and folding cartons. Tin plate, aluminium and composite cans. Glass containers

Packaging of fresh fruits and vegetables, cereals, pulses, millets, oilseeds, meat, fish, poultry and dairy products.

Plant Management, cost accounting and storage procedures

FSSAI & Regulatory requirements of food industries.

Structure and operation of food plants.

Computer applications, database, operating systems, networking, and project management. Industrial cost accounting, purchase procedure, stores procedure, materials accounting, overheads, budget and budgetary control, and product costing.



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Post Code: TA-05

Area: Microbiology

Introduction to Microbiology and Microbial Diversity

Diversity of Microbial World- Systems of classification & General characteristics, An overview of Scope of Microbiology. Development of microbiology as a discipline, Spontaneous generation vs. biogenesis, Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology

Bacteriology

Cell organization, Bacteriological techniques (culture media, sterilization, isolation methods, staining, preservation) Microscopy, Growth and nutrition, Reproduction in Bacteria, Bacterial Systematics, Important archaeal and eubacterial groups.

Fungi

General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultrastructure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexualmechanism.

Algae

General characteristics of algae including occurrence, thallus organization, algae cell ultra-structure, pigments, flagella, eyespot food reserves and vegetative, asexual and sexual reproduction

Protozoa

General characteristics with special reference to Amoeba, Paramecium and Plasmodium

Biochemistry

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

Virology

Nature and Properties of Viruses, Bacteriophages, Viral Transmission, Salient features of viral nucleic acids and Replication, Viruses and Cancer, Prevention & control of viral diseases and Applications of Virology

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.

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.

Microbial Genetics

Genome Organization and Mutations, Plasmids, Mechanisms of Genetic Exchange, Phage Genetics, Transposable elements.

Environmental Microbiology

Microorganisms and their habitats, Microbial Interactions, Biogeochemical Cycling, Waste Management, Microbial Bioremediation, Water Potability.



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 ((causative agents, foods involved, symptoms and preventive measures)), Food sanitation and control, Cultural and rapid detection methods of food borne pathogens in foods and introduction to predictive microbiology

Industrial Microbiology

Introduction to industrial microbiology, Isolation of industrially important microbial strains and fermentation media, Types of fermentation processes, bio- reactors and measurement of fermentation parameters, Down-stream processing, Microbial production of industrial products (micro-organisms involved, media, fermentation conditions, downstream processing and uses), Enzyme immobilization.

Immunology

Immune Cells and Organs, Antigens, Antibodies, Major Histocompatibility Complex, Complement System, Generation of Immune Response, Immunological Techniques.

Medical Microbiology

Normal microflora of the human body and host pathogen interaction, Bacterial diseases, Viral diseases, Protozoan diseases, Fungal diseases, Antimicrobial agents: General characteristics and mode of action

Bioinformatics

Introduction to Computer Fundamentals, Introduction to Bioinformatics and Biological Databases, Sequence Alignments, Phylogeny and Phylogenetic trees, Genome organization and analysis and Protein Structure Predictions

Plant Pathology

Introduction and History of plant pathology, Stages in development of a disease, Plant disease epidemiology, Host Pathogen Interaction, Control of Plant Diseases, Specific Plant diseases Study of some important plant diseases giving emphasis on its etiological agent, symptoms, epidemiology and control

Biostatistics

Measures of central tendency, Measures of dispersion; skewness, kurtosis; Elementary Probability and basic laws; Discrete and Continuous Random variable, Mathematical Expectation; Curve Fitting; Correlation and Regression. Emphasis on examples from Biological Sciences; Mean and Variance of Discrete and Continuous Distributions namely Binomial, Poisson, Geometric, Weibull, Logistic and Normal distribution. Fitting of Distributions; Statistical methods: Scope of statistics: utility and misuse. Principles of statistical analysis of biological data. Sampling parameters. Difference between sample and Population, Sampling Errors, Censoring, difference between parametric and non-parametric statistics; Sampling Distributions, Standard Error, Testing of Hypothesis, Level of Significance and Degree of Freedom; Large Sample Test based on Normal Distribution, Small sample test based on t-test, Z- test and F test; Confidence Interval; Distribution-free test - Chi-square test;

Microbial Biotechnology

Microbial Biotechnology and its Applications, Therapeutic and Industrial Biotechnology, Applications of Microbes in Biotransformations, Microbial Products and their Recovery, Microbes for Bio-energy and Environment, RNAi and Intellectual Property Rights

Advances in Microbiology

Evolution of Microbial Genomes, Metagenomics, Molecular Basis of Host-Microbe Interactions and Systems and Synthetic Biology

Instrumentation and Biotechniques

Microscopy, Chromatography, Electrophoresis, Spectrophotometry and Centrifugation



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Recombinant DNA Technology and Cloning Vectors

Definition and Properties of Plasmid vectors, Transformation of DNA, DNA Amplification and DNA sequencing, PCR: Basics of PCR, RT-PCR, Real-Time qPCR, Sanger's method of 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. And Applications of Recombinant DNA Technology.



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Post Code: TA-06

Area: Chemistry

Basic Concepts of Chemistry (Organic, Inorganic and Physical Chemistry)

Importance and scope of chemistry, Laws of chemical combination, concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass; percentage composition, empirical and molecular formula, chemical reactions. Organic Chemistry: IUPAC nomenclature

Structure of Atom

Atomic number, isotopes and isobars, concept of shells and subshells, dual nature of matter and light, concept of orbital, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals, electronic configuration of atoms, stability of half-filled and completely filled orbitals.

Classification of Elements and Periodicity in Properties

Periodic table: s, p, d and f-Block Elements: Modern periodic law and long form of the periodic table, periodic trends in properties of elements based upon electronic configuration, atomic radii, ionic radii, valence, Diagonal relationship, inert pair effect, atomic and ionic radii, ionization energy.

Molecular Structure and Chemical Bonding

Electrovalent, covalent and Coordination Compounds: Valence electrons, bond parameters, Lewis structure, polar character of covalent bond, valence bond theory, resonance, geometry of molecules, VSEPR theory, concept of hybridization involving s, p and d orbitals and shapes of some simple molecules. Weak Interactions: Hydrogen bonding, Van der Waals forces. Hybridization, bond length, bond energy, bond angle, localised and delocalized *pi*-bonds, resonance, inductive effect and shapes of molecules and ions. Aromaticity.

States of Matter

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, Boyle's law, Charle's law, Avogadro's law, ideal behaviour of gases, empirical derivation of gas equation. Avogadro number, ideal gas equation. Liquid State-Vapour pressure, viscosity and surface tension.

Thermodynamics

First, Second and Third law of Thermodynamics and Chemical Kinetics, Rate of a reaction (average and instantaneous), factors affecting rates of reaction.

Redox Reactions

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions in terms of loss and gain of electron and change in oxidation numbers.

Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of chemical equilibrium, equilibrium constant, ionic equilibrium-ionization of acids and bases, strong and weak electrolytes, degree of ionization, acid strength, concept of pH, Hydrolysis of salts (elementary idea), buffer solutions.

Chemical Kinetics

Concentration, temperature, order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions), Method of determination of order of reaction.



रैಎಸ್ಐಆರ್ - ಕೇಂದ್ರೀಯ ಆಹಾರ ತಂತ್ರಜ್ಞಾನ ಸಂಶೋಧನಾಲಯ, ಮೈಸೂರು - 570 020, ಭಾರತ सीएसआईआर – केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020, भारत CSIR - Central Food Technological Research Institute, Mysuru - 570 020, India

Organic compounds and reactions

Alkanes, Alkenes, Alkynes, Alcohols, Aldehydes, Ketones, Carboxylic Acids, Phenols and Ethers (stereochemistry), Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions, Electronic displacements in a covalent bond: inductive effect, electrometric effect, resonance and hyper conjugation.

Biomolecules

Carbohydrates- Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D.L. configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance.

Proteins - Elementary idea of - amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and guaternary structure (gualitative idea only), denaturation of proteins; enzymes.

Hormones- elementary idea (excluding structure), Vitamins- Classification and function, Nucleic Acids: DNA and RNA.

Polymers

Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers like polyesters, bakelite, rubber, Biodegradable and non-biodegradable polymers.

Surface Chemistry:

Adsorption-physisorption and chemisorption, factors affecting adsorption of gases on solids catalysis homogeneous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophillic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions- types of emulsions. concept of collision theory (elementary idea, no mathematical treatment). Activation energy, Arrhenious equation, catalyst.

General Principles and Processes of Isolation of Elements

Principles and methods of extraction- concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron. Actinoids: Electronic configuration, oxidation states and comparison with lanthanoids.

Chromatography

Principle and application of TLC and paper Chromatography

Spectroscopy

Principle, instrumentation and application of IR, UV

Environmental Chemistry

Environmental pollution: Air, water and soil pollution, chemical reactions in atmosphere, smogs, major atmospheric pollutants, acid rain ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming-pollution due to industrial wastes; green chemistry as an alternative tool for reducing pollution, strategy for control of environmental pollution.

Chemistry in Everyday Life

Chemicals in medicines-analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines.

Chemicals in food-preservatives, artificial sweetening agents, elementary idea of antioxidants. Cleansing agents- soaps and detergents, cleansing action.