NITC/13-1/2022-RO 25 August 2023

GP B & C POSTS: SCHEME OF EXAMINATION AND SYLLAUBS FOR SKILL TEST - TECHNICAL POSTS

1. The skill test would be of qualifying nature. The skill test would be conducted in two phases viz., preliminary and advanced.

(a) Preliminary test - May consist of written exam of 60 to 90 minutes duration and may consist of MCQ or descriptive questions related to the trade / specialization / post.

(b) Advanced test – To test the practical and advanced knowledge of the candidate related to the trade / specialization / post. May be Practical / MCQ / Descriptive type.

(c) Qualification Criteria - To qualify the skill test, the candidate has to qualify both preliminary and advanced phases separately.

2. The preliminary and advance skill tests may be combined depending upon the requirements of the post and administrative necessity of the Institute.

SYLLABUS

Post: Junior Engineer (both preliminary and advanced)

Diploma syllabus in relevant specialisation (Civil / Electrical). Domain theoretical / practical knowledge at the Diploma level in the relevant area specific to the post relating to practical aspects of work/ instruments / Laboratory systems/ best practices in Industry/ Experimental/ Analytical/ Model/ Prototype Development / Estimation of Works etc. Thirty percentage (30%) of syllabus/ questions from relevant branch of BE/B Tech may also be included. An indicative list of topics for civil and electrical specialisations is appended below

Post: Technical Assistant (both preliminary and advanced)

Diploma syllabus in relevant specialisation. Domain theoretical / practical knowledge at the Diploma Level in the relevant area specific to the post related to the trade/ specialisation relating to practical aspects of work/ instruments / Laboratory systems/ best practices in Industry/ Experimental/ Analytical/ Model/ Prototype Development etc. Thirty percentage (30%) of syllabus/ questions from relevant branch of BE/B Tech may also be included. An indicative list of topics for various trades is appended below.

Post : Senior Technician (both preliminary and advanced)

10+2 science syllabus specific to the trade. Domain theoretical / practical knowledge in the relevant area specific to the post related to the opted trade/ specialisation, relating to instruments / Laboratory systems/ Practical/ Experimental/ Analytical/ Model/ Prototype Development etc. Thirty percentage (30%) of syllabus/ questions from relevant branch of Diploma may also be included. An indicative list of topics for various trades is appended below.

Post : Technician (both preliminary and advanced)

10+2 science syllabus specific to the trade. Domain theoretical / practical knowledge in the relevant area specific to the post related to the opted trade/ specialisation, relating to instruments / Laboratory systems/ Practical/ Experimental/ Analytical/ Model/ Prototype Development etc. Thirty percentage (30%) of syllabus/ questions from relevant branch of Diploma may also be included. An indicative list of topics for various trades is appended below.

JUNIOR ENGINEER / TECHNICAL ASSISTANT / SENIOR TECHNICIAN / TECHNICIAN: INDICATIVE LIST OF TOPICS FOR DIFFERENT SPECIALISATIONS/ TRADES (both preliminary and advanced)

Chemistry/Chemical

Inorganic chemistry (Atomic structure, Chemical bonding, Periodicity, Coordination Chemistry, Acid-Base titrations, redox titration, Volumetric Analysis, qualitative analysis of cations and anions), Organic Chemistry (Aliphatic and aromatic hydrocarbons, Halogenated Hydrocarbons, Alcohols, Phenols, Ethers and Epoxides, carbonyl compounds, Carboxylic Acids, organometallic compounds, heterocyclic Compounds, functional group identification), Physical chemistry (Gaseous, Liquid and Solid state, thermodynamics, Chemical equilibrium, colligative property, Chemical Kinetics, electrochemistry, potentiometric and conductometric titrations). Introduction to Chemical Engineering, Industrial Chemistry, Chemical Process Calculations, Momentum Transfer, Mechanical Operations, Engineering Thermodynamics, Process Heat Transfer, Mass Transfer, Chemical Engineering Thermodynamics, Chemical Technology, Chemical Reaction Engineering, Process Control & Instrumentation, and Project Engineering.

Biology/ Bio Technology

Structure of bacteria, fungi, virus, simple staining, differential staining, classification of bacterial culture media based, microbial media preparation, microbial culture & preservation, kinetics of cell growth, Monod model, product formation kinetics, different modes of cultivation systems, oxygen requirements for microbial growth and sterilisation requirements; qualitative tests for identification of carbohydrate, proteins and lipids, quantitative tests for determination of concentration of sugars, proteins etc.

in body fluids, Gel electrophoresis, DNA/RNA isolation, restriction enzymes, ligation, polymerase chain reaction, RT PCR, pulse field gel electrophoresis, Southern Blot, Northern Blot, Western Blotting, PH, E.coli transformation, blue white screening; Cell disruption techniques & tools, general chromatography theory and chromatographic techniques used for downstream processing of biological materials, applications of centrifuge, distillation unit, separation of proteins using SDS-PAGE; Principles & applications of TEM, SEM, phase contrast microscopes, fluorescence microscope, confocal laser scanning microscope, antigen-antibody reactions, ELISA, immune-electrophoresis, hemagglutination & blood grouping, production/ purification of antibodies; Laboratory setup, equipment & safety in plant tissue culture laboratory, explant selection, preparation & sterilisation; callus induction & differentiation; shoot & root initiation & development, micropropagation techniques; protoplast isolation & fusion; aseptic procedures & handling of culture vessel; vegetative propagation from axillary buds, genomic DNA isolation from plant samples; plasmid DNA isolation from agrobacterium; retrieving a sequence-nucleic acid/ protein, pairwise comparison of sequences using dynamic programming, pairwise comparison of techniques using BLAST, alignment of multiple sequences, phylogenetic analysis, secondary & tertiary structure prediction of proteins, identification of functional sites in genes & genomes, restriction mapping of DNA sequences, protein-ligand interactions, comparison of two genomes, primer design, protein-protein interaction analysis; microarray data analysis;

General laboratory skills like preparation of solutions & calculations; preparation of buffers with particular pH & adjustment; focussing stained slides using microscope at different objectives; electrophoresis (Agarose/SDS PAGE); staining techniques; identify commonly used equipment in the laboratory; colorimetric assays (spectrophotometer operation); streaking bacterial culture in a laminar flow hood; common bioinformatics software; autoclaving preparations & operation; bacterial culture, storage, biosafety;

Civil

Construction Materials, Basic Surveying, Mechanics of Materials, Building Construction, Concrete Technology, Geotechnical Engineering, Hydraulics, Advanced Surveying, Theory of Structure, Building Planning and Drawing, AutoCAD, Water Resources Engineering, Transportation Engineering, Design of Steel and RCC structures, Estimating and Costing, Public Health Engineering

Computer Science/IT

Operating System concepts and commands – basic concepts, process, thread, cpu scheduling, memory management, primary & secondary memory, virtual memory, file system, practical knowledge of system configuration & administration in Linux and Windows OS; DBMS – Concepts, data, relational model concepts, ER model, relational algebra operations including different joints, SQL, features of SQL, SQL commands, referential integrity, aggregate & scalar functions in SELECT statements; Computer networks – LAN cables & connectors, IPv4, IPv6, DNS, DHCP, ARP, TCP/IP, IP addressing & subnetting, VLAN, ACLs; Software engineering &

programming – software development life cycle, activities & deliverables, programming concepts & constructs, procedural & object oriented paradigms; C, C++ programming; Computer hardware & organisation – computer components, basic organisation of CPU, instruction fetch & execute, interrupts, instruction pipelining, memory hierarchy, I/O devices, interconnection structures, buses;

Practical exam/descriptive test on any one of the following area selected by the candidate – programming using C/C++/JAVA; database design & queries using SQL & demonstrating using available front-end; computer networking (crimping, network design, L2 switch/L3 switch/router configuration, VPN, ACLs, Rules)

Electrical

Basic Electrical Engineering, Introduction to Electric Generation Systems, Electrical Circuits, Electrical and Electronic Measurements, Electric Motors and Transformers, Renewable Energy Power Plants, Fundamentals of Power Electronics, Electric Power Transmission and Distribution, Induction, Synchronous and FHP Machines, Microcontroller Applications, Energy Conservation and Audit, Building Electrification.

Electronics & Communications

Basic Electronics Engineering, Principles of Electronic Communication, Electronic Devices and Circuits, Digital Techniques, Electronic Measurements and Instrumentation, Electric circuits and network, Microcontrollers and Applications, Consumer Electronics, Digital Communication Systems, Embedded Systems, Computer Networking and Data Communication

Mechanical/ Material Science

Engineering Mechanics, Computer Aided Machine Drawing Practice, Material Science & Engineering, Fluid Mechanics & Hydraulic Machinery, Manufacturing Engineering, Thermal Engineering, Measurements & Metrology, Strength of Materials, Theory of Machines & Mechanisms, Industrial Engineering & Management, Design of Machine Elements, Production & Operations Management; Mineral Processing, Fuels & Refectories, Ferrous Metallurgy, Environmental Studies, Material Testing, Physical Metallurgy, Principle of Extractive metallurgy, Sponge Iron & Ferro Alloys, Heat Transfer Fluid Flow & Furnace, Heat Treatment Technology, Foundry Technology, Non-Ferrous Metallurgy, Mechanical Metallurgy, Industrial Metallurgy

Library Science

Historical Development of Libraries in India, Types of Libraries, Library and Information Science Education in India. Trends in Scholarly Communication, Sources of Information, Community Information Services, Reference Services, Library Classification Schemes, Indexing Systems and Techniques, Basic computer knowledge, and automation.

Registrar