I.K Gujral
Punjab Technical University, Jalandhar
Jalandhar-Kapurthala Road, Kapurthala-144603

I.K Gujral Punjab Technical University, Jalandhar is in search of suitable candidates for the appointment to the following posts:-

Name of Post (s)	Pay Scale	No. of Posts
Technical Assistant	Level-11 / Rs. 10,300-34,800/- (GP 3800) **(**Unrevised)	19

For detail regarding eligibility, reservation, general conditions and syllabus for written test, please visit the University website *www.ptu.ac.in*. **Last date of submission of online application is 24.03.25**

Advt.No.2025/02/03 **REGISTRAR**

Please Click here for apply: https://jobs.ptu.ac.in

I.K. Gujral Punjab Technical University, Jalandhar

Jalandhar-Kapurthala Road, Kapurthala-144603

Advertisement No. 2025/02/03

Applications are invited from the eligible candidates for the following posts in the pay scales indicated as under:-

1.	**Name of the Post & Pay Scales**	Technical Assistant, Group-B, Level-11 / Rs.10,300-34,800 (GP 3800) Unrevised,	
2.	**No. of Post**	19	
3.	**Code**	TA001	
4.	**Eligibility Criteria / Qualification**		
	Graduate with minimum 50% marks in relevant subject / field* or its equivalent from a recognized Institution by State / Centre Govt. OR 3 years diploma in relevant subject / field* from recognized Institution. OR MCA/B.Tech. (Computer Science).		
	***Relevant subject / field of essential qualification is as under:-**		
	Physics	1-SC (Female)	B.Sc degree with Physics as one of the subject from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Electronics & Communication Engineering	1-Gen (Female)	B.Tech / B.E (Electronics & Communication Engineering) from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Electrical Engineering	1-Gen	B.Tech / B.E (Electrical Engineering) from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Civil Engineering	1-SC, 1-Gen	B.Tech / B.E (Civil Engineering) from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Chemistry	1-Gen	B.Sc degree with Chemistry as one of the subject from any recognized University or Institute approved by MHRD/AICTE/UGC
	Mechanical Engineering	1-SC, 1-ESM (Female), 1-BC (Female)	B.Tech / B.E (Mechanical Engineering/ production Engineering) from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Computer Science Engineering / IT	1-SC (Female), 1-Gen (Female), 1-Gen, 1-ESM, 1-BC, 1-Gen (EWS-Female), 1-Handicapped (Female)	B.Tech / B.E in Computer Science / Information Technology or MCA/M.Sc (IT)/ M.Sc (CSE) from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Food Sciences	1-SC	B.Sc (Food Science / Bio-Chemistry / Bio-Technology / Micro-Biology / B. Pharmacy) from any recognized University or Institute approved by MHRD/AICTE/UGC
	Hotel Management	1-Gen	B.Sc in Hospitality and Hotel Administration / BHMCT from any recognized University or Institute approved by MHRD/AICTE/UGC.
	Journalism and Mass Communication	1-Gen	B.A. (Journalism & Mass Communication) / Bachelor in Journalism from any recognized University or Institute approved by MHRD/AICTE.
Note:- Candidate must have passed Punjabi as one of the subject at Matric level.			
Abbreviations:- SC-Schedule Class, Gen-General, BC-Backward Class, ESM-Ex-Servicemen, EWS-Economically Weaker Section,			

General Instruction /Terms & Condition.

1. The candidates should read carefully the eligibility, experience criteria etc. laid down in the advertisement before applying for these posts. If at any stage during the recruitment and selection process, it is found that candidates have furnished false or wrong information, their candidature will be rejected.

2. University will conduct a written test of 60 marks with multiple choice questions with one mark for each question in the relevant subject/discipline. The written test will be of 90 minutes. There will be no negative marking. The candidate is to select one specific answer and write/mark it on the answer sheet (OMR) with only dark black ball pen as per the instructions contained in the Question Paper Booklet / OMR Sheet. In the written test, qualifying marks will be 50% for all other categories and 45% for SC/ST category. On failing to get the qualifying marks (50% & 45% marks) in the written test of 60 marks, candidate will be declared disqualified and his/her candidature will not be considered for further process. Thereafter, University will conduct an interview of 40 marks. Number of candidates to be called for the interview for each stream / discipline will be decided by the Hon'ble Vice-Chancellor of the University.

3. Application once submitted cannot be altered / resubmitted under any circumstances. Further, no request with respect to making changes in any data / particulars entered by the candidate in the online Application will be entertained, once the application submitted successfully.

4. Application fee is Rs.1000/- for General, Rs.250/- for SC/ST/BC/EWS, Rs.200/- for Ex-Servicemen and Rs.500/- for Physical handicapped (Including GST). Fee is to be deposited as per the directions given while filling online application form.

5. Reservation Policy shall be as per Punjab Government norms.

6. Must have passed Punjabi as one of the subject at Matric level.

7. Age for General Category will be 18 to 37 and relaxation in age for other categories will be as per Punjab Govt. norms.

8. Candidates belonging to any reserved category have to submit a relevant certificate issued by the Competent Authority.

9. Posts are transferable within IKGPTU Campuses (Main Campus, Amritsar, Mohali and Hoshiarpur) under the Jurisdiction of IKG Punjab Technical University.

10. Canvassing in any manner would entail disqualification of the candidate.

11. Original documents as mentioned in application forms (Academic etc.) will have to be shown when asked by the University.

12. Candidates called for test shall not be entitled for TA/DA.

13. The decision of IKGPTU in the matters of selection and appointment shall be final and no correspondence in this regard will be entertained.

14. If any candidates apply in such category which is not reserved for him/her in the advertisement, the application of such candidates will stand cancelled and fee shall not be refunded by the University.

15. Incomplete application, applications of ineligible candidates, applications without supporting documents (Academic etc.) and fee etc. shall be rejected without any intimation.

16. Last date to submit Online Application is 24.03.25 upto 5.00 PM.

17. No correspondence whatsoever will be entertained from candidates regarding eligibility / conduct / result of selection process and reasons for not being called for written test.

18. Eligibility/qualification as mentioned in the eligibility criteria will be considered as per the relevant documents submitted by the candidates with online application form.

19. For any query please email at recruitment@ptu.ac.in or contact at 01822-662509.

20. All the communications with candidate will be on the email provided in the online application form, therefore, candidate should keep their email id provided in the application form active. University will not be responsible for non-receipt / delay in receipt of any communication due to deactivation of email id given or due to change in address etc.

21. Further detail regarding amendment/corrigendum will be uploaded on University's official website www.ptu.ac.in. Candidates are required to visit official website regularly.

22. In service candidates must submit "**No Objection Certificate**" (NOC) and **"Vigilance Clearance Certificate"** (VCC) and last pay drawn certificate along with online submission of application form. In the absence of NOC & VCC, candidate will not be considered for written test.

23. Any legal proceedings in respect of any matter of claim or dispute arising out of this advertisement can be in courts / tribunals/ forums at Kapurthala only.

24. In case of any dispute, decision of the Vice-Chancellor, IKGPTU shall be final.

25. University Reserves the right not to fill the advertised post(s). The number of post(s) may be increased / decreased.

26. Probation period and pay scale during the probation period will be applicable as per IKGPTU norms.

27. The appointment of the candidate(s) will be governed by the University norms.

28. Request for postponement of any of the above activity or for change of venue, date and shift will not be entertained under any circumstances.

SYLLABUS FOR WRITTEN TEST OF TECHNICAL ASSISTANT

I.K. Gujral Punjab Technical University, Kapurthala

Physical Sciences

Syllabus for the written test of Technical Assistant

Electromagnetic Theory

Scalars and Vectors, Dot product and cross product, Del operator, Physical significance of gradient, divergence and curl, Gauss divergence theorem, Green's theorem and Stoke's theorem, Solution of electrostatic and magnetostatic problems including boundary value problems, Dielectric polarization, Gauss's law, Biot-Savart's law and Ampere's law with their applications, Electromagnetic induction, Faraday's law, electromotive force, mutual and self-inductance, Continuity equation, Maxwell's equations, concept of displacement current, Uniform plane waves, Wave equations and its solutions in different media, Poynting vector and theorem, Electromagnetic waves and their reflection and polarization. Electromagnetic spectrum.

Mechanics

Laws of motion, Motion in a uniform field, Components of velocity and acceleration in different coordinate systems, Uniformly rotating frame. Centripetal acceleration, Coriolis force and its applications, Motion under a central force, Kepler's Law, Gravitational law and field, Potential due to a spherical body, System of particles, Centre of mass, Equation of motion, Conservation of linear and angular momenta, Conservation of energy, Elastic and inelastic collisions, Rigid body motion, Rotational motion, Moments of inertia, Euler's equations. Special Theory of Relativity: Galilean transformations, Einstein postulates and Lorentz transformation, length contraction, time dilation, addition of velocity, variation of mass with velocity, mass energy relation, energy-momentum relation. Oscillations: Simple harmonic oscillations, kinetic and potential energy, total energy and their time average values, simple and compound pendulum, torsional pendulum, damped oscillations, forced oscillations, power dissipation, quality factor, bar pendulum, Kater's pendulum.

Optics and Lasers

Lenses and mirrors, magnifying and resolving power of telescope, Interference: superposition of light waves, Young's double slit experiment, coherent sources of light, Fresnel Biprism, Displacement of fringes, Interference in thin films, Newton's Rings, Michelson interferometer, Diffraction: Fresnel diffraction and Fraunhofer diffraction, single slit and N-slit diffraction, Effect of diffraction in optical imaging. Polarization: Plane polarized light, elliptically polarized light, Wire grid and sheet polarizer, Malus law, Brewster's law, Nicol prism, retardation plates, production analysis of polarized light, quarter and half wave plates. Fibre Optics: Principles of fibre optics, Types of fibres, acceptance angle and cone, numerical aperture and V number, applications of fibre optics. Lasers: Properties of laser, spontaneous and stimulated emissions condition for laser action, population inversion, Einstein coefficients, Types of lasers: Ruby laser, Nd: YAG laser, Helium-Neon laser, Carbon dioxide laser, dye laser, semiconductor laser, Holography, Q-switching and mode locking, Applications of lasers.

Quantum mechanics

Black body radiation, Photoelectric effect, Compton effect, de Broglie concept of matter waves, Uncertainty principle and its applications, Born's interpretation and normalization of Wave function, time dependent and time independent Schrodinger's wave equations with application for particle in one dimensional infinite potential well, Tunnel effect.

Atomic and Molecular physics

Bohr and Sommerfeld model, Hydrogen atom spectrum, electrons spin, Franck -Hertz and Stern-Gerlach experiments, Significance of four quantum numbers and concept of atomic orbitals, electric dipole transitions and selection rules, Franck-Condon principle, Raman spectroscopy, X ray spectrum, Moseley's law, double structure of X rays absorption Spectra.

Nuclear and particle physics

Structure of atomic nucleus, mass and binding energy, nuclear forces, nuclear spin, magnetic moment, liquid drop and shell models, radioactivity and its applications, laws of radioactive decay, Fission and fusion, interaction of charged particle and neutron with metal, working of nuclear detectors. Particle physics: Elementary particles properties, cosmic connections, Symmetries and conservation laws, Particle properties and their reactions, particle accelerators and detectors.

Solid State Physics

Elements of crystallography, lattice vibrations, diffraction of x rays by crystal, Bragg's law, Bragg's spectrometer, bonding in solids, elastic properties of solids, defects in crystals, Magnetic properties of matter: dia, para, ferro and ferrimagnetic materials and relevant theories, Curie law, B-H curve, Hysteresis and Energy loss, Superconductivity: Critical temperature, critical magnetic field, Meissner effect, Type I and Type II superconductors, BCS theory, London's equations and flux penetration, Elementary band theory: free electron theory, band theory of solids, Bloch theorem, Kronig Penney model, types of semiconductors, effective mass, conductivity of semiconductors, Hall effect.

Thermal Physics

Wiedemann-Franz law, Thermal equilibrium, Entropy, The laws of thermodynamics, the thermal conductivity of bulk materials, Phonons: lattice vibration heat transfer, the specific heat of solids, classical, Einstein and Debye Model, Ideal quantum gases: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac statistics.

Electronics

Semiconductor diodes, half wave rectifiers, full wave rectifiers, calculation of ripple factors and rectification efficiency, Zener diode as voltage regulator, photovoltaic cell, photo diode, LEDs. Bipolar junction transistors, Field effect transistors, amplifiers and oscillator circuits, basic logical gates, Boolean algebra, sequential circuits, flip flops, counters, registers, A/D and D/A conversion.

I.K. Gujral Punjab Technical University, Jalandhar

Electronics and Communication Engineering

Syllabus for the written test of Technical Assistant

ELECTRONIC INSTRUMENTS AND MEASUREMENT: Basics of Measurements, Voltage, Current and Resistance Measurement, Cathode Ray Oscilloscope. Signal Generators and analytical Instruments, Impedance Bridges and Q Meters, Digital Instruments.

PRINCIPLES OF COMMUNICATION ENGINEERING: Need for modulation, Amplitude modulation, Frequency modulation, Phase modulation, Principles of modulators, Principles of FM Modulators. Demodulation of AM Waves, Demodulation of FM Waves, Pulse Modulation.

DIGITAL ELECTRONICS: Distinction between analog and digital signal, Applications and advantages of digital signals, Number System, Codes and Parity, Logic Gates and Families, Logic Simplification, Arithmetic circuits, Decoders, Multiplexers and De Multiplexers, Latches and flip flops, Counters, Shift Register, A/D and D/A Converters.

ELECTRONIC DEVICES AND CIRCUITS: Multistage Amplifiers, Large Signal Amplifier, Feedback in Amplifiers, Sinusoidal Oscillators, Tuned Voltage Amplifiers. Wave Shaping Circuits, Multivibrator Circuits, Operational Amplifiers, Regulated DC Power Supplies, Opto Electric Devices.

ELECTRICAL MACHINES: Three Phase Supply, Transformers, Introduction to Rotating Electrical Machines, DC Machines, A.C. Motors, Single Phase Fractional Kilowatt Motors.

COMPUTER PROGRAMMING AND APPLICATIONS: Algorithm and Program Development, Program Structure (C Programming), Functions. Arrays, Pointers, Strings, Data files, Software Applications in Electronics Engineering.

NETWORK FILTERS AND TRANSMISSION LINES: Networks, Attenuators, Filters, transmission Lines. COMMUNICATION SYSTEMS-1: AM/FM Transmitters, AM/FM Radio Receivers, Antennas, Propagation. Fiber Optic Communications, Satellite Communications.

POWER ELECTRONICS: Introduction to thrusters and other power Electronic Devices, Controlled Rectifiers, Inverters, Choppers, Dual Converters and Cyclo converters, Thyristorised Control of Electric drives, Uninterrupted Power supplies.

CONSUMWER ELECTRONICS: Audio Systems, Television, LCD and LED Television: Basic principle and working of LCD and LED TV, Cable Television: Working of cable TV, DTH and Consumer appliances.

PERSONAL COMPUTER ORGANIZATION (PCO): Mother Board, Buses and Ports, Memory, Keyboard and Mouse, CRT Display Devices, Printers.

COMMUNICATION SYSTEMS-II: Introduction, Coding, Digital Modulation Techniques, Characteristics/working of data transmission circuits, UART, USART, Modems, Telemetry, Electronic Exchange.

MICROWAVE AND RADAR ENGINEERING: Introduction to Microwaves, Microwave Devices, Wave guide, Microwave Components, Microwave antennas, Microwave Communication system, Radar Systems, Introduction to VSAT transponders multiple access techniques, VSAT and its features.

WIRELESS AND MOBILE COMMUNICATION: Wireless Communication, Cellular Concept, Multiple Access Techniques for Wireless Communication, Mobile Communication System.

I.K. Gujral Punjab Technical University, Jalandhar

Electrical Engineering

Syllabus for the written test of Technical Assistant

FUNDAMENTALS OF ELECTRICAL ENGINEERING: Application and Advantages of Electrical Energy, DC Circuits, Batteries, Magnetism and Electromagnetism, Electromagnetic Induction, AC Fundamentals, AC Circuits, Poly-Phase systems.

ELECTRONICS: Brief history of development of electronics, Semi-conductor Theory, Semiconductor Diodes, Bi-polar Transistors, Transistor Biasing and Stabilization, Single- Stage Transistor Amplifiers, Multi- Stage Transistor Amplifiers. Field Effect Transistor (FET), Transistor Audio Power Amplifier, Tuned Voltage Amplifier, Feedback in Amplifiers. Sinusoidal Oscillators, Wave-Shaping and Switching Circuits, Power supplies, Operational Amplifier.

ELECTRICAL AND ELECTRONICS ENGINEERING MATERIALS: Classification, Conducting Materials, Review of semi-conducting Materials, Insulating materials, General Properties, Insulating Materials and their applications, Magnetic Materials, Special Materials, Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, Generators, transformers etc.

ELECTRICAL ENGINEERING DESIGN AND DRWING: Symbols and signs Conventions, Panel/Distribution Board, Orthographic Projections of Simple Electrical Parts, Orthographic Projection of Machine Parts, Contactor Control Circuits.

ELECTRICAL MACHINES: Introduction to Electrical Machines, DC Machines, Transformers (single phase), Transformers Three Phase, Synchronous Machines, Induction Motors, Fractional Kilo Watt (FKW) Motors, Special Purpose Machines.

ELECTRICAL MEASURING INSTRUMENTS AND INSTRUMENTATION: Introduction to Electrical Measuring Instruments, Ammeters and Voltmeters (Moving coil and moving iron type), Wattcmeters (Dynamometer Type), Energy meter (Induction type), Miscellaneous Measuring Instruments, Electronic Instruments, LCR meters, Power measurements in 3-phase circuits.

ESTIMATING AND COSTING IN ELECTRICAL ENGINEERING: Purpose of estimating and costing, Types of wiring, Estimating and Costing, Estimating the material required for Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, earthing etc. based on unit cost calculations, Substation.

ELECTRICAL POWER: Power Generations, Economics of Generation, Transmission Systems, Distribution System, Substations, Power Factor, Faults, Switch Gears, Protection Devices, Protection Scheme, Over-voltage Protection, Various Types of Tariffs.

INDUSTRIAL ELECTRONICS AND CONTROL OF DRIVES: SCR, Controlled Rectifiers, Inverters, Choppers, Duel Converters and Cycle Convertors. Thruster Control of Electric Drives, Uninterrupted power supplies.

INSTRUMENTATION: Measurements, Transducers, Force and Torque Measurement .Pressure Measurement, Flow Measurement, Measurement of Temperature, Measurement of other non electrical quantities.

DIGITAL ELECTRONICS AND MICROPROCESSORS: Number system, Gates, Boolean Algebra, Combinational Circuits, Flip-Flops, Introduction of Shift Registers and Counters, A/D and D/A Converters, Semi-conductor Memories, Microprocessor of 8085.

UTILIZATION OF ELECTRICAL ENERGY: Illumination, Electric Heating. Electric Welding, Electrolytic Processes, Electrical Circuits used in Refrigeration, Air Conditioning and Water Cooler, Electric Drives, Electric Traction.

MODERN ELECTRIC TRACTION: Electric Traction System, System of Track Electrification, Track Mechanics, Power Supply arrangement, Equipment used in and outside the Locomotive, Traction Motors and Traction Motor Control. Braking, Train Lighting, Railway Coach Air-conditioning.

I.K. Gujral Punjab Technical University, Jalandhar

Computer Science Engineering / IT

Syllabus for the written test of Technical Assistant

COMPUTER PROGRAMMING USING 'C': Algorithm and Programming Development, Program Structure, Control Structure, Functions, Arrays, Pointers, Structures and Unions, Strings Files.

RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS): Introduction, Database System, Database System Concepts and Architecture, Data Modeling using E.R. Model (Entity Relationship Model), Relational Model: Relational Model Concepts, Normalization, Database Access and Security, MYSQL/SQL (Structured Query Language) SQL* Plus, DDL (Data Definition Languages, PL/SQL).

MULTIMEDIA AND APPLICATIONS: Introduction, Multimedia Hardware, Multimedia Software, Using Image Processing tools, Multimedia Authoring Tools.

DATA STRUCTURES USING 'C': Fundamental Notation, Arrays, Linked Lists, Stacks, Queues and Recursion, Trees, Sorting and Searching.

OBJECT ORIENTED PROGRAMMING USING C++: Introduction and Features, Language Constructs, Classes and Objects, Member Functions, Overloading Member Functions, Inheritance, Polymorphism and Virtual Functions, File and Streams, Introduction to Standard Template Library (STL).

COMPUTER ARCHITECTURE: Data Representation, Data Types-Number system, I's Complement, 2's Complement, BCD Code, Gray Code, Central Processing Unit, Introduction, General Register Organization, Stack Organization**,** Instruction Formats, Addressing Modes, Introduction to RISC, CISC architecture, Pipeline processing, Arithmetic Operations, Introduction, Addition, Subtraction, Multiplication and Division algorithm, Input-output Organization, Memory Organization.

INTERNET AND WEB TECHNOLOGIES: Internet Basics, Internet Connectivity, World Wide Web (WWW), Internet Security, Developing Portals Using HTML, Server-side Scripting, Dream weaver.

COMPUTER PERIPHERALS AND INTERFACING: Video Display, Hardware organization of PCs, Storage Devices, Input Devices, Output Devices, Power Supplies, Basic Input/output System, Other technologies.

OPERATING SYSTEMS: Overview of Operating System, Functions of Operating System, Linux Operating System.

COMPUTER NETWORK: Network Basics, OSI Model, Introduction to TCP/IP. Protocol Suites, Network Architecture. Network, Connectivity, Network, Administration/Security, Network Trouble Shooting Techniques, Wireless Networking.

OPEN SOURCE TECHNOLOGIES: Introduction, Practice with Linux Commands, Shell Programming, Communication Commands (utilities), and Introduction to C/C^{++} Programming in Linux environment, Introduction to Apache Server with PHP and My SQL.

NETWORK SECURITY: Introduction, Securing Data over Internet, Virus, Worms and Trojans, Computer Network Attacks, Firewalls, Intrusion Detection System (IDS), Virtual Private Network (VPN) Disaster and Recovery, OS Vulnerabilities.

INSTALLATION, MAINTENANCE AND TROUBLE SHOOTING OF COMPUTER NETWORKS: Installation, Repair, Servicing and Maintenance Concepts, Fundamental trouble Shooting Procedures, Networking, Trouble shooting of computers, component and peripherals, Sharing of devices on Networks, Installation and management of network sharing tools, Establishment of LAN/WAN.

I.K. Gujral Punjab Technical University, Jalandhar

Civil Engineering

Syllabus for the written test of Technical Assistant

FLUID MECHANICS: Properties of Fluids, Pressure, Measurement of Pressure, Fundamentals of Fluid Flow, Flow Measurement Flow through Pipes, Flow through open channels, Hydraulic Pumps.

APPLIED MECHANICS: Laws of forces, Moment, Friction, Centre of Gravity, Simple Machines.

SURVEYING: Basic principles of surveying, Chain surveying, Compass surveying, Leveling Plane Table Surveying, Concept of Two point and Three point problems, Contouring, Theodolite Surveying, Tacho-metric surveying, Curves, Introduction to the use of Modern Surveying equipment and techniques.

CONSTRUCTION MATERIALS: Building Stones, Bricks and Tiles, Cement, Lime, Timber and wood Based Products, Paints and Varnishes, Ferrous metals, Miscellaneous materials.

BUILDING CONSTRUCTION: Building, Foundations, Walls, Masonry, Arches and Lintels, Doors, Windows and Ventilators, Damp Proofing and Water Proofing, Floors, Roofs, Glossary of terms, Surface Finishes, Anti Termite Measures, Building Planning, Building Services.

CONCRETE TECHNOLOGY: Definition of concrete, Ingredients of Concrete. Water Cement Ratio, Workability, Properties of Concrete, Proportioning for Normal Concrete, Introduction to Admixtures, Special Concretes Concreting Operations, Transportation of concrete, Importance and methods of non-destructive tests.

IRRIGATION ENGINEERING: Irrigation, Water Requirement of Crops, Hydrological Cycle, Methods of Irrigation, Canals, Tube Well Irrigation, **Dams,** Canal Head Works and Regulatory Works, Cross Drainage Works, River Training Works, Water Logging and Drainage and Ground Water Re-charge.

STRUCTURAL MECHANICS: Properties of Materials, Simple Stresses and Strains, Shear Force and Bending Moment, Moment of Inertia, Bending Stresses in Beams, Combined Direct and Bending Stresses, Shear Stresses in Beams, Slope and Deflection, Columns, Analysis of Trusses.

REINFORCED CONCRETE DESIGN: Concept of Reinforced Cement Concrete (RCC() RCC design, Shear and Development Length, Singly Reinforced Beam, Concept of Limit State Method, Singly Reinforced beam, One and Two Way Slab, Axially Loaded Column, Prestressed Concrete.

HIGHWAY ENGINEERING, RAILWAYS, BRIDGES AND TUNNELS: Importance of Highway engineering, Road Geometrics: Highway Surveys and Plan, Road Materials, Road Pavements, Hill Roads, Road Drainage, Road Maintenance, Road Construction Equipment, Railway surveys, Bridge, Classification of Bridges, Bridge Foundations, Maintenance of Bridges, Tunnels, Ventilation, Drainage method of draining water in tunnels, Lighting of tunnels.

SOIL AND FOUNDATION ENGINEERING: Importance of soil studies, Physical Properties of Soils, Classification and Identification of soils, Flow of Water through Soils, Effective Stress. Deformation of Soils, Shear Strength Characteristics of Soils, Compaction, Soil Exploration, Bearing Capacity of soil, Foundation Engineering.

STEEL STRUCTURES DESIGN: Structural Steel and Section, Riveted Connections, Welded connections, Tension Members, Compression Members, Roof Trusses, Columns, Beams, Fabrication and Erection of Steel Structures.

EARTHQUAKE RESISTANT BUILING CONSTRUCTION: Elements of Engineering Seismology, Seismic Behavior of Traditionally-Built Constructions of India, Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-Built Constructions, Brick and RCC Structures.

CONSTRUCTION MANAGEMENT: Significance of construction management, Construction Planning, Organization, Site Organization, Construction Labour, Control of Progress, Inspection and Quality Control, Accidents and Safety in Construction.

REPAIR AND MAINTENCE OF BUILDINGS: Need for Maintenance, Agencies Causing Deterioration, Investigation and Diagnosis of Defects, Defects and their root cause, Materials for Repair, maintenance and protection, Remedial Measures for Building Defects.

PRESTRESSED CONCRETE: Basic concept of prestressed concrete, Materials, Prestressing Methods, Bending and Shear Capacity, Losses in Prestressing.

I.K. Gujral Punjab Technical University, Jalandhar

Mechanical Engineering

Syllabus for the written test of Technical Assistant

APPLIED MECHANICES: Concept of engineering mechanics, Laws of forces, Moment: Centre of Gravity, Simple Machines.

MECHANICAL ENGINEERING DRAWING: Limits and fits, Intersection of following solids, Pipe Joints. Electrical Circuit Diagram, Instructional strategy.

CRYSTALLOGRAPHY: Fundamentals, Cast Iron: Different types of Cast Iron, manufacture and their usage, Steels, Non Famous Materials, Theory of Heat Treatment, Engineering Plastics, Advanced Materials, Miscellaneous Materials.

HYDRAULICS AND PNEUMATICS: Introduction to Pressure and its Measurement, Flow of Fluids, Hydraulic System, Water Turbines and Pumps, Introduction to Oil Power Hydraulics and Pneumatics, Components of Hydraulic Systems, Components of Pneumatic Systems.

THERMODYNAMICS: Fundamental Concepts, Laws of perfect Gases, Thermodynamics Processes on Gases, Laws of Thermodynamics, Air Standard Cycles, Air Compressors, Introduction to Heat Transfer, IC Engines, Fuel Supply and lgnition System in Petrol Engine, Fuel System of Diesel Engine, Cooling and Lubrication, Testing of IC Engines, Steam Turbines and Steam Condensers, Gas Turbines and jet Propulsion.

STRENGTH OF MATERIALS: Concept of load, stresses and strain, Resilience: Moment of Inertia; Bending Moment and Shearing Force, Bending stresses, Columns, Torsion, Springs.

WORKSHOP TECHNOLOGYI: Cutting Tools and Cutting Materials Lathe Drilling, Boring, Shaping, Planning and Slotting, Broaching, Jigs and Fixtures. Cutting Fluids and Lubricants.

MECHNICAL ENGINEERING DRAWING: Introduction to drawing office equipment through a visit to modern drawing office of an industry. I.C. Engine Parts. Boiler Parts, Cams, Gears.

PRODUCTION MANAGEMENT: Functions (Elements) of PPC, Plant Location, Layout and Material Handling, Inventory, Repair and Maintenance, Value Engineering, Cost Estimation and Control.

REFRIGRATION AND AIR CONDITIONING: Fundamentals of Refrigeration, Vapour Compression System, Refrigerants, Air Refrigeration, System Vapour Absorption System, Refrigeration Equipment, Air conditioning.

WORKSHOP TECHNOLOGY: Milling, Grinding, Gear Manufacturing and Finishing processes, Modern Machining processes, Metallic Coating processes, Metal Finishing Processes.

THEROY OF MACHINES: Simple Mechanisms, Friction, Power Transmission, Flywheel, Governor, Balancing, Vibrations.

COMPUTER AIDED DRAFTING: Concept of AutoCAD, Detail and assembly drawing of the following using AUTOCAD, Isometric Drawing by CAD using Auto CAD.

METROLOGY AND INSTRUMENTATION: Metrology, Linear and Angular Measurement, Measurement of Surface Finish, Measurement of screw threads and Gauges, Instrumentation, Quality Control.

AUTOMOBILE ENGINEERING: Automobile, Power System, Transmission System, Steering System, Braking System, Suspension System, Battery, Dynamo and Alternator, Exhaust Emission.

MACHINE DESIGN: Design, Design terminology, Engineering materials and their mechanical properties. Design Failure, Design of Shaft, Design of Key, Design of Joints, Permanent Joint, Design of Flange Coupling, Design of Screwed Joints.

CNC MACHINES AND AUTOMATION: Introduction to NC, CNC, & DNC. Construction and Tooling, Part Programming, System Devices, Problems in CNC Machines, Automation and NC system.

I.K. Gujral Punjab Technical University, Jalandhar

Chemistry

Syllabus for the written test of Technical Assistant

Inorganic Chemistry

Atomic Structure Heisenberg uncertainty principle, Schrodinger wave equation. Aufbau and Pauli exclusion principle, Hund's multiplicity rule and periodic properties of elements.

Chemical Bonding Covalent Bond-Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions and valence shelf electron pair repulsion (VSEPR) theory.

S.p.d and f Block Elements General characteristics properties, Comparative studies, diagonal relationship, salient features.

Oxidation and reduction Use of redox potential data, analysis of redox cycle, redox stability in water, principles involved in the extraction of the elements

Coordination Compounds Werner coordination theory, Effective atomic number, chelates, nomenclature, isomerism Valence bond theory.

Acids and Bases Arrhenius, Bronsted-Lowry, the Lux-Flood, solvent system and Lewis concepts of acids and bases and Hard and Soft Acids and Base concept.

Metal-ligand Bonding in Transition Metal Complexes limitations of valence bond theory, an elementary idea of crystal field theory, CF splitting in octahedral, tetrahedral and square planar complexes, affecting the crystal field parameters.

Magnetic Properties of Transition Metal Complexes Types of Magnetic behavior, methods odf determining magnetic susceptibility, spin only formula. L-S coupling, correlation ofμ_s and μ_{eff} values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Electron Spectra of Transition Metal Complexes Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, and petrochemical series. Orgel energy level diagram for d^1 and d^9 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3-}$ complex ion.

Thermodynamic and Kinetic Aspects of Metal Complexes thermodymic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes.

Organometallic Chemistry Definition, nomenclature and classification of organometallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn and Ti, Metal-alkyls, Metal-carbenes and metal-carbynes.

Bioinorganic Chemistry Essential and trace elements in biological processes, metalloporphyrins, haemoglobin and myoglobi, Biological role of alkali and alkali earth metal ions with special reference to Ca^{2-}, Nitrogen fixation Silicones and Phosphazenes silicones and Phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.

Organic Chemistry

Structure and Bonding Hybridization, bond lengths, bond angles, bond energy, localized and delocalized chemical bond, van der waals interactions, inclusion compounds, clatherates, charge transfer complexes resonance, hyper conjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions Curved arrow notation, drawing electron movements with arrows, half-beaded and double-headed arrows, hemolytic and heterolytic bond breaking. Types of reagents-electrophones and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates (carbocations, carbanions, free radicals, carbenes, arynes and nitrenes). Assigning formal charges on intermediates and other ionic species, Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Stereochemistry of Organic Compounds isomerism and its types, Optical isomerism-elements of symmetry, molecular chirality, enantiomers, stereogenic center, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogeric centers, diastereomers, threo and erythro, diastereomers, meso compounds.resolution of enantiomers, inversion, retention and racemization, Relative and absolute configuration, sequence rules, D &L and R & S systems of nomenclature. Geometric isomerism – determination of configuration of geometric isomers E & Z systems of nomenclature, geometric isomerism in oximes and alicyelic compounds Conformational isomerism – conformation analysis of ethane and n-burane; conformational analysis of cyclohexane, axial and equatorial bonds, confirmation of mono substituted cyclohexane derivative. Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and confirmation.
Introduction, IUPAC nomenclature, Isomerism and classification, Methods of preparation, chemical properties of Alkanes, cycloalkanes, Alkenes, Cycloalkanes, Dienes, Alkynes Alkenes, Cycloalkanes, Dienes, and Alkynes, Alkyl halides, Aryl Halides, Alcohols, phenols, Aldehyde and Ketones, ethers, epoxide, carboxylic acid derivatives.

Arenes and Aromaticty Nomenclature of benzene derivatives. Aryl group, nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure Stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckel rule, aromatic ions, Aromatic electrophilic substitution-general pattern of mechanism, role of sigma and pi complexes. Methods of formation and chemical reactions.
Organic Spectroscopy Fundamentals and basic techniques of Ultraviolet, Infrared and NMR Spectroscopy.
Organic compounds of Nitrogen Preparation of nitroalkanes and nitroarenes, Chemical reactions of nitroalkanes, Mechanisms of nucleophilc substitution in nitroarenes and their reduction in acidic., neural and alkaline media Reactivity, Structure and nomenclature of amines, Methods of preparation of amines by Reductive amination of adehydic and ketonic compounds, Gabriel-phthalimide reaction amd Hofmann bromatnice reaction Physical properties. Stereochemistry of amines, separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts.
Spectroscopy Nuclear Magnetic Resonance Spectroscopy Proton Magnetic resonance spectroscopy. Nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde,1,1,2 –tribromoethane, ethyl acierate, toluene and acetophenone, Problem pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.
Organometallic Compounds the Grignard reagents-formation, structure and chemical reactions, organozinc compounds: Formation and chemical reaction. Organolithiem compounds formation and chemical reaction.

Physical Chemistry

Gaseous States Postulates of kinetic theory of gases, ideal behavior, van der Waal's equation of state Critical Phenomena PV isotherms of real gases, continuity of state, the isotherms of van der Waal's equation relationship between critical constants and van der Waal constants, the law of corresponding states, reduced equation of state Molecular Velocities.
Liquid state Intermolecular forces structure of liquids (a qualitative description). Structural differences between solids, liquids and gases. Liquid crystals.
Colloidal State Definition of colloids, classification of colloids. Solids in liquids (sol, kinetic, optical and electrical, properties, stability of colloids, projective action. Hardy Schulze law, gold number. liquids in liquids(emulsions).

Solutions Dilute solutions and Colligative Properties Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, colligative properties.

Thermodynamics Definition of thermodynamic terms: system, surrounding etc. Type of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. First Law of Thermodynamic Statement, definition of Internal energy and enthalpy. Second Law of Thermodynamic: Need for the law different Statements of the law, cannot cycle and its efficiency, Cannot theorem. Concept of Entropy:Entropy as a state function, entropy as a function of V & T. entropy as a function of P & T. entropy change in physical change. Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions: Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, A & G criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change, Variation of G and A with P,V and T.

Chemical Equilibrium: Equilibrium constant and free energy. Thermodynamic derivation of law of mass action. Determination of Kp, Kc, Ka and their relationship, Clausius-Clapeyron equation, applications. Introduction to Phase Equilibrium, Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibria of one component system-water, CO_2, and S systems. Phase equilibria of two component systems-solid-liquid equilibria, simple Eutectic-Bi-Cd, Pb-Ag systems.

Electrochemistry: Electrical transport-conduction in metals and in electrolyte solutions, specific conductance andequivalent conductance, measurement of equivalent conductance, variation of equivalent andspecific conductance with dilution. Migration of ions and Kohlrausch law, Arrhenius theory ofelectrolyte dissociation and its limitations, weak and strong electrolytes. Ostwald's dilution law, its uses and limitations Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only). Transport number, definition and determination by Hittorf method and moving boundary method. Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations. Types of reversible electrodes-gas metal ion, metal ion, metal insoluble salt-anion and redoxelectrodes. Electrode reactions. Nernst equation, derivation of cell EMF and Single electrode potential, standard hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, electrochemical series and its significance.

Nuclear Chemistry Introduction: Radioactivity, Nuclear Structure, Size of Nucleus, Mass Defects and Binding Energy, Nuclear Stability, Nuclear Forces, Nuclear Spin and Moments of Nuclei, Nuclear Models, NuclearDecay Processes, The Laws of Radioactive Decay. Soddy-Fajans Group Displacement Law, Rate of Nuclear Decay and Half Life Time (Kinetics of Radioactive Decay), Induced Nuclear Reactions Types of Nuclear Processes, High Energy Nuclear Reactions, Nuclear Reaction Cross-Section, Artificial radioactivity, Detection and Measurement of Radioactivity, Nuclear Fission, Nuclear Fission, Applications of Radioactivity.

Spectroscopy Introduction: Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Borm-Oppenheinner approximation, degrees of freedom. Rotational Spectrum, Vibrational Spectrum and Electronic Spectrum, Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of s, p, and n M.O., their energy levels and the respective transitions.

Quantum Mechanics: Black-body radiation, Planck's radiation law, Photoelectric effect, heat capacity of solids. Bohr's model of hydrogen atom (no derivation) and its defects, Compton effect. de Broglie hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance. physical interpretation of the wave

function, postulates of quantum mechanics, particle in a one dimensional box, quantization of energy levels, extension to two and three dimensional boxes, degeneracy Simple harmonic oscillator model of vibrational motion, setting up Schrodinger equation and discussion of solution and wave functions. Solid State Definition of space lattice and unit cell, Law of crystallography- (i) Law o constancy of interfacial angles, (ii) Law of rationality of indices, (iii) Symmetry elements in crystals. X-ray diffraction by crystals. Derivation of Bragg's Law in Reciprocal space. Determination of crystal structure of NaCI, KCI by use of Powder method; Laue's method.

Photochemistry: Interaction of radiation with matter, difference between thermal and photochemical processes Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law, Jablonski diagram depicting various process occurring in the excited stats, qualitative description of flourescence, phosphorescence, non-radiative process (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer process (simple examples)

I.K. Gujral Punjab Technical University, Jalandhar

Food Science and Technology

Syllabus for the written test of Technical Assistant

Food spoilage-sources. General principles of food processing and preservation by additives, high and low temperature, drying, irradiation, sugar, salt. Introduction to microbiological techniques: sterilization techniques, staining techniques, techniques for isolation of bacteria. Microbiological analysis of food products: bacterial count, yeast and mold count, coli form count. Microbiological testing of water. Food laws and food safety (HACCP, GMP, GHP, ISO 9000 series, ISO 22000, Codex alimentarius, FPO, MPO, MMPO, FSSAI, BIS, PFA etc.), Food adulteration. Preparation of jams, jellies, marmalades, juices, squashes, ketchup, pickles and chutneys. Liquid milk processing, fermented milks. Preparation of milk products cheese, condensed and evaporated milk, whole and skim milk powder and ice cream. Proximate composition of cereals, flour and its use in bakery products bread, biscuits, cakes, doughnut and buns. Additives for bakery industry. Milling of different cereals, parboiling of rice. Composition, nutritive value and functional properties of eggs. Meat tenderization. Principles of meat preservation. Dimensions and Units. Material and energy balance. Unit operations in food processing. Role of microorganisms in fermented foods-bread, malt beverages, wine, vinegar, butter and cheese. Principles of food packaging, packaging materials, packaging methods and machinery. Packaging requirements for different food products.

Elements of mechanics, colligative properties, laws of thermodynamics, modes of heat transfer. Outlines in optics and sound, electromagnetic radiation

Concept of pH and buffer. Isomerism, structural and optical isomers, food chemistry, composition of foods, minerals in foods, water activity in foods, carbohydrates, mono and di- saccharides, reducing and non-reducing sugars, starch, cellulose, pectins, plant acids and proteins, primary, secondary and tertiary structures of proteins, protein denaturation, peptide bonds, amino acids, saturated and unsaturated fats, rancidity.

Theory of quadratic equations, binomial theorem, uses of natural and common logarithms, trigonometry, ratios and their relations, basics of matrices, vectors, determinants

Organization of animal tissues, nucleic acids, endocrine glands, digestion, absorption.

I.K. Gujral Punjab Technical University, Jalandhar

Hotel Management

Syllabus for the written test of Technical Assistant

Unit 1: Introduction to Hospitality Industry

Historical evolution of the hospitality industry; Structure and sectors of the hospitality industry (hotels, restaurants, resorts); Key terminology and significance in the global economy; Roles and responsibilities of a Technical Assistant

Unit 2: Front Office Operations

Guest services and reservations; Check-in and check-out procedures; Handling guest complaints; Use of Property Management Systems (PMS); Maintaining guest relations

Unit 3: Housekeeping Management

Housekeeping operations and cleaning techniques; Inventory control; Maintenance of public areas and guest rooms; Quality standards and safety procedures; Role of housekeeping in guest satisfaction

Unit 4: Food and Beverage Management

Principles of food and beverage operations; Menu planning and food safety; Sanitation practices; Restaurant operations and bar management; Catering services and cost control

Unit 5: Food Production

Basics of food production and kitchen layout; Culinary techniques and equipment; Various cuisines and food presentation; Importance of nutrition and hygiene in food preparation

Unit 6: Hospitality Marketing

Marketing principles in hospitality; Market research and branding; Digital marketing strategies; Customer relationship management; Promoting hotels and restaurants

Unit 7: Financial Management in Hospitality

Budgeting and forecasting; Financial analysis and cost control; Revenue management; Understanding financial statements specific to hospitality

Unit 8: Human Resource Management

Recruitment and training processes; Performance appraisal and employee motivation; Labor laws and workplace diversity; Managing employee relations

Unit 9: Hospitality Law and Ethics

Legal aspects of hotel management (contracts, liability, compliance); Ethical issues in hospitality; Importance of maintaining integrity and professionalism

Unit 10: Technology in Hospitality

Role of technology in hospitality operations; Information systems and online booking platforms; Customer management software; Impact of emerging technologies (Al, IoT, block chain) on hospitality

I.K. Gujral Punjab Technical University, Jalandhar

Journalism and Mass Communication Programme

Syllabus for the written test of Technical Assistant

Unit 1

General Knowledge, Current Affairs and General Awareness, Basics of Communication, Process of Communication, Forms of communication, Mass Communication.

Unit 2

Audio and Visual Media: Handling of Still and Video Cameras, Teleprompter, Importance of audio, photo and video production skills in the newsroom, Types of photographic cameras and their structure, Lenses (types and their perspective/angle of view), Aperture (f-stop & T-stop), Shutters (Focal plane & Lens shutter), Light meter.

Basics of Sound, Audio Console, Types of Sound-Sync, Non-Sync, Natural sound, Ambience Sound Sound Design-Its Meaning with examples from different forms, Sound recording techniques, Introduction to microphones. Introduction to Recording and Editing sound.

Unit 3

Lighting: Understanding Light and Shadow; Natural light and Artificial Light, The Nature of Light-Direct Light, Soft light, Hard light, Directional Light, Brightness, Contrast, Mid tones, Highlights, Lighting equipment, Three Point Lighting Technique and Metering for Light, Filters and Use of a Flash.

Unit 4

Computer Application and New Media: Basics of Microsoft office, Installation of Computer software and networking, Data Transfer, Basic Soft-wares and Techniques, Photo and Video Editing software. Digital Media and Mobile Journalism.