F. No. : Admn. 1(4)/2018/Tech dated 25.06.2025

सी एस आई आर – भारतीय रासायनिक जीवविज्ञान संस्थान
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NOTIFICATION

Sub: Subject wise syllabus for Paper III for the positions of Technical Assistant and Technician (1) to be referred for both Trade and Written Tests against the advertisement no. R&C/600/2025

It is hereby nofified for the information of all concerned that the vacancy code-wise syllabus for the Written Test (Paper-III – Concerned Subject) for the positions of **Technical Assistant** and **Technician (1)** under **Advertisement No. R&C/600/2025** is enclosed as **Annexure I to X**. The same syllabus shall also be applicable for the **Trade Test**.

All candidates are advised to refer to the annexures for detailed post code wise syllabus.

Digitally signed by Sumana Majumdar
Date: 25-06-2025 18:06:25

प्रशासन नियंत्रक / Controller of Administration

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(ii) Office Copy

ANNEXURE: I

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002501)

Foundational Knowledge

Qualitative analysis, Quantitative analysis, Volumetric analysis, Titrimetric analysis, Gravimetric analysis, Instrumental analysis, Molarity Concentration, Normality, Molality, Formality, Equilibrium Molarity.

Gaseous, liquid, and solid states

The Vander-Waal's equation, Joule Thomson effect and inversion temperature of a gas, Kinetic theory of gases, ideal gas laws, Intermolecular forces, Surface tension, Viscosity of a liquid, Effect of temperature on surface tension, Nature of the solid state, law of constancy of interfacial angles, law of rational indices, qualitative idea of point and space groups, X-ray diffraction, Bragg's law.

Chemical bonding

Ionic bond nature, properties of ionic compounds, radius ratio, coordination number, Lattice energy, Born- Haber cycle and its applications, solvation enthalpy, and solubility of ionic compounds. Covalent bond- valence bond theory and its limitations, hybridisation, and shapes of simple molecules.

Atomic Structure

Bohr model of hydrogen atom, limitations of Bohr theory, photoelectric effect, idea of de Broglie matter waves, Heisenberg's uncertainty principle and its significance, Schrodinger wave equation, wave functions, spin quantum number(s), shapes of s, p and d orbitals, Hund's rule.

Periodic Properties

Periodic trends in atomic volume, atomic and ionic radii, ionisation enthalpy, electron affinity (electron gain enthalpy), electronegativity and metallic character, Pauling's electronegativity scale, Classification of elements as s, p, d & f block.

Acids, Bases, and Non-Aqueous Solvents

Lowery-Brønsted and Lewis concepts of acids and bases- introduction to SHAB principle. General properties- classification, self-ionization, and levelling effect reaction in non- aqueous solvents, protic and aprotic non-aqueous solvents, pH, pKa.

Structure and Bonding

Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bonding, van der Waals interactions, inclusion compounds, charge transfer complexes, resonances, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions

Homolytic and heterolytic bond fission, Types of reagents, electrophiles, and nucleophiles. Types of organic reactions. Reactive intermediates, Carbocations, carbanions, free radicals, carbenes, arynes, and nitrenes.

Isomerism and Stereochemistry

Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention, and racemization. Determination of configuration of geometric isomers, E & Z system of nomenclature.

Hydrocarbons (aliphatic and aromatic), Carbonyls, Amines, Amides

Preparation, properties, and chemical reactions

Units and Measurements

Systems of units; SI units, fundamental and derived units. significant figures. Dimensions of physical quantities, dimensional analysis, and its applications.

Chromatographic and Spectroscopic Techniques

Basic understanding of general spectroscopic and chromatographic techniques, principles, and applications in the purification and structure elucidation of organic compounds. General knowledge about the instruments such as NMR, Mass, IR, HPLC, UV-Vis.

Thermodynamics

Laws of thermodynamics, Concept of enthalpy and entropy, Joule's experiment, free energy and applications

Mathematics and Statistics

Functions, limits, derivatives, physical significance, basic rules of differentiation, maxima, and minima. Permutations, combinations, and theory of probability. Errors, accuracy, and precision. Normal law of distribution, statistical test of data, F, Q, and t test, Signal-to-noise ratio, limit of detection (LOD), and quantification, calibration curves.

ANNEXURE: II

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002502)

Cell Biology

Cells as basic functional unit of living body, cellular classification (i.e. eubacteria, archaebacteria, eukaryotes), Prokaryotic cell organization, Eukaryotic cell organization (Brief idea of structure and function of Plasma membrane, Nucleus, Endoplasmic reticulum, Golgi apparatus, Mitochondria, Chloroplast, Lysosome, Peroxisome, cytosol, Plant cell wall, Plant cell vacuole, and Brief idea of cell cycle.

Molecules of Life

Importance of carbon molecule (valency, chiral carbon, types of isomers), Concept of intra- and intermolecular interaction (covalent bond, ionic bond, hydrogen bond, hydrophobic interaction, van der Waals interaction), Structure and Water, Henderson-Hasselbalch equation & its significance, Concept of pH / pKa, isoelectric pH and Buffer. Structure and function of Carbohydrate, Lipids, Amino acids, Proteins, and Enzymes.

Bioenergetics and Metabolism

Glycolysis, Fate of pyruvate under aerobic and anaerobic condition, TCA cycle, electron transport chain, oxidative phosphorylation, role of inhibitors and uncouplers. Glycogenesis, Glycogenolysis, Gluconeogenesis, Pentose phosphate pathway, β-oxidation of saturated fatty acid, Transamination, oxidative deamination, and urea cycle.

Basic Concepts of Genome and its Organisation

Nucleic acids the genetic material (Griffith's experiment, Avery, MacLeod and McCarty's experiment, Hershey-Chase experiment), Importance of Molecular Biology, Central Dogma of Molecular Biology, Model organisms for studying Molecular Biology. Structure and functions of Nucleic acids, biologically important nucleotides, Watson and Crick model of DNA structure, A, B & Z forms of DNA, Supercoiled and relaxed DNA, denaturation, and renaturation of DNA, melting temperature (Tm), hyperchromic effect. Genome and its organisation, replication of nucleic acid.

Replication of DNA in *prokaryotes*

Features of DNA Replication, Proof of semiconservative nature of DNA replication, Features of bidirectional DNA replication. Mechanism of bidirectional DNA replication.

Gene Expression

RNA structure and types of RNA, Transcription in prokaryotes with *E. Coli* as model system: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains, Genetic code, properties of genetic code, Wobble hypothesis Components of Protein synthesis: mRNA, tRNA structure and function.

Damage, Repair and Mutation

Causes (spontaneous, chemical agent, radiation) and types of DNA damage Mechanism of DNA repair: Direct repair, base excision repair, nucleotide excision repair, mismatch repair, recombination repair. Molecular basis of mutation, and types of mutation.

Diffusion

Boyle's law, Charles' law, Gas laws (Ideal gas and real gas equation), Dalton's law of partial pressure. Diffusion in fluids, Fick's laws (Statement and explanation), Facilitated diffusion e.g. gas exchanges in lungs.

Osmosis

Definition, contrast with diffusion, Tonicity and isotonic solutions. Effect of tonicity on R.B.C. Cell nutrition.

Spectrophotometry and other Methods

Absorption of light, Transmittance, Absorbance (Optical density), Lambert-beer law, Method of determining Absorption spectrum of chlorophyll by spectrophotometer. A brief idea on Dialysis, Chromatography (Gel filtration, Ion exchange), Electrophoresis.

Immunology

Immune Response - An overview, Primary and secondary immune response, components of mammalian immune system. Basic concepts of Molecular structure of Immunoglobulins/Antibodies, Humoral & Cellular immune responses, T-lymphocytes & immune response.

Toxicology

Exposure to toxicants: routes/methods of exposure, frequency and duration of exposure, dose- response relationship. Concept, significance, basic mechanisms of selective toxicity, bioassay, acute toxicity tests, chronic toxicity tests, Concept of maximum acceptable toxicant concentration and safe concentration. Toxicology concepts: bio- concentration, bioaccumulation, and biomagnifications.

Microbiology and Pathology

Viruses, bacteria, and other microbes, structure and life cycle, Infection and immunology, applications of microbiology in industry (agriculture, chemical and medicine) and pollution control, important diseases caused by viruses, bacteria, mycoplasma, fungi and nematodes, modes of infection and dissemination. Molecular basis of infection and disease resistance/defense. Physiology of parasitism and control measures, fungal toxins. Parasites causing diseases in humans and their life cycles;Vector borne diseases.

Staining and Microscopy

Histology, Gram Positive &Gram Negative staining, Haematoxylin and Eosin staining,andCell counting.

ANNEXURE: III

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002503)

Cell Biology

Cells as basic functional unit of living body, cellular classification (i.e. eubacteria, archaebacteria, eukaryotes), Prokaryotic cell organization, Eukaryotic cell organization (Brief idea of structure and function of Plasma membrane, Nucleus, Endoplasmic reticulum, Golgi apparatus, Mitochondria, Chloroplast, Lysosome, Peroxisome, cytosol, Plant cell wall, Plant cell vacuole, and Brief idea of cell cycle.

Molecules of Life

Importance of carbon molecule (valency, chiral carbon, types of isomers), Concept of intra- and intermolecular interaction (covalent bond, ionic bond, hydrogen bond, hydrophobic interaction, van der Waals interaction), Structure and Water, Henderson-Hasselbalch equation & its significance, Concept of pH / pKa, isoelectric pH and Buffer. Structure and function of Carbohydrate, Lipids, Amino acids, Proteins, and Enzymes.

Bioenergetics and Metabolism

Glycolysis, Fate of pyruvate under aerobic and anaerobic condition, TCA cycle, electron transport chain, oxidative phosphorylation, role of inhibitors and uncouplers. Glycogenesis, Glycogenolysis, Gluconeogenesis, Pentose phosphate pathway, β-oxidation of saturated fatty acid, Transamination, oxidative deamination, and urea cycle.

Basic Concepts of Genome and its Organisation

Nucleic acids the genetic material (Griffith's experiment, Avery, MacLeod and McCarty's experiment, Hershey-Chase experiment), Importance of Molecular Biology, Central Dogma of Molecular Biology, Model organisms for studying Molecular Biology. Structure and functions of Nucleic acids, biologically important nucleotides, Watson and Crick model of DNA structure, A, B & Z forms of DNA, Supercoiled and relaxed DNA, denaturation, and renaturation of DNA, melting temperature (Tm), hyperchromic effect. Genome and its organisation, replication of nucleic acid.

Replication of DNA in *prokaryotes*

Features of DNA Replication, Proof of semiconservative nature of DNA replication, Features of bidirectional DNA replication. Mechanism of bidirectional DNA replication.

Gene Expression

RNA structure and types of RNA, Transcription in prokaryotes with *E. Coli* as model system: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains, Genetic code, properties of genetic code, Wobble hypothesis Components of Protein synthesis: mRNA, tRNA structure and function.

Damage, Repair and Mutation

Causes (spontaneous, chemical agent, radiation) and types of DNA damage Mechanism of DNA repair: Direct repair, base excision repair, nucleotide excision repair, mismatch repair, recombination repair. Molecular basis of mutation, and types of mutation.

Diffusion

Boyle's law, Charles' law, Gas laws (Ideal gas and real gas equation), Dalton's law of partial pressure. Diffusion in fluids, Fick's laws (Statement and explanation), Facilitated diffusion e.g. gas exchanges in lungs.

Osmosis

Definition, contrast with diffusion, Tonicity and isotonic solutions. Effect of tonicity on R.B.C. Cell nutrition.

Spectrophotometry and other Methods

Absorption of light, Transmittance, Absorbance (Optical density), Lambert-beer law, Method of determining Absorption spectrum of chlorophyll by spectrophotometer. A brief idea on Dialysis, Chromatography (Gel filtration, Ion exchange), Electrophoresis.

Immunology

Immune Response - An overview, Primary and secondary immune response, components of mammalian immune system. Basic concepts of Molecular structure of Immunoglobulins/Antibodies, Humoral & Cellular immune responses, T-lymphocytes & immune response.

Toxicology

Exposure to toxicants: routes/methods of exposure, frequency and duration of exposure, dose- response relationship. Concept, significance, basic mechanisms of selective toxicity, bioassay, acute toxicity tests, chronic toxicity tests, Concept of maximum acceptable toxicant concentration and safe concentration. Toxicology concepts: bio- concentration, bioaccumulation, and biomagnifications.

Microbiology and Pathology

Viruses, bacteria, and other microbes, structure and life cycle, Infection and immunology, applications of microbiology in industry (agriculture, chemical and medicine) and pollution control, important diseases caused by viruses, bacteria, mycoplasma, fungi and nematodes, modes of infection and dissemination. Molecular basis of infection and disease resistance/defense. Physiology of parasitism and control measures, fungal toxins. Parasites causing diseases in humans and their life cycles;Vector borne diseases.

Staining and Microscopy

Histology, Gram Positive &Gram Negative staining, Haematoxylin and Eosin staining,andCell counting.

ANNEXURE: IV

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002504)

Cell Biology

Cells as basic functional unit of living body, cellular classification (i.e. eubacteria, archaebacteria, eukaryotes), Prokaryotic cell organization, Eukaryotic cell organization (Brief idea of structure and function of Plasma membrane, Nucleus, Endoplasmic reticulum, Golgi apparatus, Mitochondria, Chloroplast, Lysosome, Peroxisome, cytosol, Plant cell wall, Plant cell vacuole, and Brief idea of cell cycle.

Molecules of Life

Importance of carbon molecule (valency, chiral carbon, types of isomers), Concept of intra- and intermolecular interaction (covalent bond, ionic bond, hydrogen bond, hydrophobic interaction, van der Waals interaction), Structure and Water, Henderson-Hasselbalch equation & its significance, Concept of pH / pKa, isoelectric pH and Buffer. Structure and function of Carbohydrate, Lipids, Amino acids, Proteins, and Enzymes.

Bioenergetics and Metabolism

Glycolysis, Fate of pyruvate under aerobic and anaerobic condition, TCA cycle, electron transport chain, oxidative phosphorylation, role of inhibitors and uncouplers. Glycogenesis, Glycogenolysis, Gluconeogenesis, Pentose phosphate pathway, β-oxidation of saturated fatty acid, Transamination, oxidative deamination, and urea cycle.

Basic Concepts of Genome and its Organisation

Nucleic acids the genetic material (Griffith's experiment, Avery, MacLeod and McCarty's experiment, Hershey-Chase experiment), Importance of Molecular Biology, Central Dogma of Molecular Biology, Model organisms for studying Molecular Biology. Structure and functions of Nucleic acids, biologically important nucleotides, Watson and Crick model of DNA structure, A, B & Z forms of DNA, Supercoiled and relaxed DNA, denaturation, and renaturation of DNA, melting temperature (Tm), hyperchromic effect. Genome and its organisation, replication of nucleic acid.

Replication of DNA in *prokaryotes*

Features of DNA Replication, Proof of semiconservative nature of DNA replication, Features of bidirectional DNA replication. Mechanism of bidirectional DNA replication.

Gene Expression

RNA structure and types of RNA, Transcription in prokaryotes with *E. Coli* as model system: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains, Genetic code, properties of genetic code, Wobble hypothesis Components of Protein synthesis: mRNA, tRNA structure and function.

Damage, Repair and Mutation

Causes (spontaneous, chemical agent, radiation) and types of DNA damage Mechanism of DNA repair: Direct repair, base excision repair, nucleotide excision repair, mismatch repair, recombination repair. Molecular basis of mutation, and types of mutation.

Diffusion

Boyle's law, Charles' law, Gas laws (Ideal gas and real gas equation), Dalton's law of partial pressure. Diffusion in fluids, Fick's laws (Statement and explanation), Facilitated diffusion e.g. gas exchanges in lungs.

Osmosis

Definition, contrast with diffusion, Tonicity and isotonic solutions. Effect of tonicity on R.B.C. Cell nutrition.

Spectrophotometry and other Methods

Absorption of light, Transmittance, Absorbance (Optical density), Lambert-beer law, Method of determining Absorption spectrum of chlorophyll by spectrophotometer. A brief idea on Dialysis, Chromatography (Gel filtration, Ion exchange), Electrophoresis.

Immunology

Immune Response - An overview, Primary and secondary immune response, components of mammalian immune system. Basic concepts of Molecular structure of Immunoglobulins/Antibodies, Humoral & Cellular immune responses, T-lymphocytes & immune response.

Toxicology

Exposure to toxicants: routes/methods of exposure, frequency and duration of exposure, dose-response relationship. Concept, significance, basic mechanisms of selective toxicity, bioassay, acute toxicity tests, chronic toxicity tests, Concept of maximum acceptable toxicant concentration and safe concentration. Toxicology concepts: bio- concentration, bioaccumulation, and biomagnifications.

Microbiology and Pathology

Viruses, bacteria, and other microbes, structure and life cycle, Infection and immunology, applications of microbiology in industry (agriculture, chemical and medicine) and pollution control, important diseases caused by viruses, bacteria, mycoplasma, fungi and nematodes, modes of infection and dissemination. Molecular basis of infection and disease resistance/defense. Physiology of parasitism and control measures, fungal toxins. Parasites causing diseases in humans and their life cycles;Vector borne diseases.

Staining and Microscopy

Histology, Gram Positive &Gram Negative staining, Haematoxylin and Eosin staining,andCell counting.

ANNEXURE: V

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002506)

Essentials of Electrical Engineering

Basics of Electric circuits, I/V characteristics and load analysis, Principles of Operations of Single phase and Three phase motors.

Production Technology

Moulding sands, Types and Properties, patterns, types of patterns, selection of patterns, Classifications of castings, according to mould materials and moulding methods. Special casting techniques, Fettling and finishing of castings - defects in castings. Classification of welding process: Principle of Gas welding, Arc welding, resistance welding, Solid State Welding, Thermochemical welding, and radiant energy welding, Brazing and soldering, thermal cutting of metal/alloys. Forging: Classification of forging processes, forging processes, forging defects and inspection. Rolling: Classification of rolling processes, rolling mill, rolling of bars and shapes.

Principles of Thermodynamics

Review of basic concepts of thermodynamics, properties of pure substances, first law applied to control mass, control volumes. First law of thermodynamics steady flow energy equation, uniform state, uniform flow. Second law statements, irreversible processes, Carnot theorem, Clausius Inequality, entropy, entropy change for pure substances, principles of liquification of gases, Joule Thompson Effect, Refrigeration and Air Conditioning.

Strength of Materials

Deflection test on springs, steel bar, cantilever beams, wooden beams. Torsion test on different grades of steel. Hardness test. Impact test.

Machine Drawing

Standardization, Interchangeability, Selective Assembly, Tolerance. Tolerance of form and position, grades of tolerance, fits, Standard tolerances, Machining symbols, surface finish indication, Functional and manufacturing datum. Shaft Couplings: rigid, flexible: cotter joints, knuckle joints, Hook's joints. Bearings, Journal, Footstep, thrust or Collar bearing; Plummer block; Pulleys for flat belts, V-belt, and rope. Engine parts, stuffing box, Connecting rod, Atomizer, spark plug, fuel injection pump. Valves, stop valve, safety valve, relief valve and non-return valve.

ANNEXURE: VI

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002507)

Basics of Circuits
Kirchoff's laws, mesh and nodal Analysis. Circuit theorems. One-port and two-port Network Functions and equivalent circuits.

MechanicalMeasurement and Industrial Instrumentation
Resistive, Capacitive, Inductive, and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity, and acceleration (translational and rotational), force, torque, vibration, and shock. Measurement of pressure, flow, temperature, and liquid level. Measurement of pH, conductivity, viscosity, and humidity.

Analog Electronics
Characteristics of diode, Zener diode, Diode circuits, Full wave and half wave rectifiers &MOSFET. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers. Operational amplifiers, characteristics, and circuit configurations. Instrumentation amplifier. Precision rectifier. V-to-I and I-to-V converter. Oscillators and signal generators.

Digital Electronics
Essentials of Boolean functions and logic gates,Basics of Analog-to-Digital and Digital-to-Analog converters.

Signals, Systems and Communications
Amplitudemodulation and frequency modulation and demodulation.

Electrical and Electronic Measurements
Bridges and potentiometers, measurement of R, L and C. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes. Extension of instrument ranges. Q-meter and waveform analyzer. Digital voltmeter and multi-meter. Time, phase, and frequency measurements. Cathode ray oscilloscope. Serial and parallel communication. Shielding and grounding. Control Systems and Process Control: Feedback principles. Signal flow graphs. Transient Response, steady-state-errors. Routh and Nyquist criteria. Bode plot, root loci. Time delay systems.

Analytical, Optical and Biomedical Instrumentation
UV, visible and IR spectrometry, X-ray, Optical sources and detectors, LED, laser, Photo-diode, photo-resistor and their characteristics. Interferometers, applications in metrology. Basics of fibre optics, Biomedical instruments and Ultrasonic transducers.

Microcontrollers and Microprocessors
Instruction set and architecture of 8085 or an equivalent microprocessor.

ANNEXURE: VII

Paper-III (Concerned Subject) Syllabus
Technical Assistant (Vacancy code 6002508)

Basics of Circuits

Kirchoff's laws, mesh and nodal Analysis. Circuit theorems. One-port and two-port Network Functions and equivalent circuits.

MechanicalMeasurement and Industrial Instrumentation

Resistive, Capacitive, Inductive, and piezoelectric transducers and their signal conditioning. Measurement of displacement, velocity, and acceleration (translational and rotational), force, torque, vibration, and shock. Measurement of pressure, flow, temperature, and liquid level. Measurement of pH, conductivity, viscosity, and humidity.

Analog Electronics

Characteristics of diode, Zener diode, Diode circuits, Full wave and half wave rectifiers &MOSFET. Transistors at low and high frequencies, Amplifiers, single and multi-stage. Feedback amplifiers. Operational amplifiers, characteristics, and circuit configurations, Operational amplifiers based PID circuits, Instrumentation amplifier. Precision rectifier. V-to-I and I-to-V converter. Oscillators and signal generators.

Digital Electronics

Essentials of Boolean functions and logic gates,Combinational and sequential circuits, Basics of Analog-to-Digital and Digital-to-Analog converters.

Signals, Systems and Communications

Amplitudemodulation and frequency modulation and demodulation,Basics of Digital Modulation techniques.

Electrical and Electronic Measurements

Bridges and potentiometers, measurement of R, L and C. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes. Extension of instrument ranges. Q-meter and waveform analyzer. Digital voltmeter and multi-meter. Time, phase, and frequency measurements. Cathode ray oscilloscope. Serial and parallel communication. Shielding and grounding. Control Systems and Process Control: Feedback principles. Signal flow graphs. Transient Response, steady-state-errors. Routh and Nyquist criteria. Bode plot, root loci. Time delay systems.

Microcontrollers and Microprocessors

Instruction set and architecture of 8085 or an equivalent microprocessor.

ANNEXURE: VIII

Paper-III (Concerned Subject) Syllabus
Technician (1) (Vacancy code 6002509)

Essentials of Electrical Engineering
Basics of Electric circuits, I/V characteristics and load analysis, Principles of Operations of Single phase and Three phase motors.

Production Technology
Principles of Moulding materials, casting and designs and moulding methods, Brazing and soldering, thermal cutting of metal/alloys and different welding techniques. Forging: Classification of forging processes, forging defects and inspection. Rolling: Classification of rolling processes, rolling mill, rolling of bars and shapes. Lathe Machine operations.

Principles of Thermodynamics
Laws of thermodynamics, Refrigeration and Air Conditioning, Heat Engines.

Strength Of Materials
Basic tests for strength of materials.

Machine Drawing
Essentials of Machine Drawings and Machining symbols, surface finish indication, Functional and manufacturing datum. Shaft Couplings: rigid, flexible: cotter joints, knuckle joints, Hook's joints. Bearings, Journal, Footstep, thrust or Collar bearing; Plummer block; Pulleys for flat belts, V-belt, and rope. Engine parts, stuffing box, Connecting rod, Atomizer, spark plug, fuel injection pump. Valves, stop valve, safety valve, relief valve and non-return valve.

ANNEXURE: IX

Paper-III (Concerned Subject) Syllabus
Technician (1) (Vacancy code - 6002510)

Basics of Circuits
Kirchoff's laws, mesh and nodal Analysis. Circuit theorems and equivalent circuits.

Measurement Tools and Instrumentation
LCR Bridge, Multi-meters, Oscilloscope, Clamp meters, Induction coils.Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes.

Analog Electronics
Characteristics of diode, Zener diode, Diode circuits, Full wave and half wave rectifiers. Transistors as Amplifiers and Oscillators, Feedback amplifiers. Basics of Operational amplifiers.

Digital Electronics
Essentials of Boolean functions and logic gates,Basics of Analog-to-Digital and Digital-to-Analog converters.

ANNEXURE: X

Paper-III (Concerned Subject) Syllabus
Technician (1) (Vacancy code 6002511)

Basics of Circuits
Kirchoff's laws, Mesh and Nodal Analysis. Circuit theorems and equivalent circuits.

Measurement Tools and Instrumentation
LCR Bridge, Multi-meters, Oscilloscope, Clamp meters, Induction coils. Measurements of voltage, current, power, power factor and energy. A.C & D.C current probes.

Analog Electronics
Characteristics of diode, Zener diode, Diode circuits, Full wave and half wave rectifiers. Transistors as Amplifiers and Oscillators, Feedback amplifiers. Basics of Operational amplifiers.

Digital Electronics
Essentials of Boolean functions and logic gates,Basics of Analog-to-Digital and Digital-to-Analog converters.

Analytical Instruments
For measuring pH, conductivity, Resistivity, Temperature, Humidity, Viscosity.