

**DETAILED SYLLABUS OF PART A**

<b>Particulars</b>	<b>Syllabus - General (Part A)</b>
<b>General Knowledge</b>	<ul style="list-style-type: none"> <li>• Facts about India and other countries: Basic facts / Geography / Tourism / Transport systems / Personalities / Places / History / Constitution / Economy / Writers / Literatures / Indian States &amp; Union Territories / International Organizations.</li> <li>• General Science : Branches of studies / Scientific instruments and appliances / Physics / Chemistry / Biology</li> <li>• Sports &amp; Games</li> <li>• Important Events/ Movements / Leaders / Places / Years</li> <li>• Writers – Authors – Biography - Autobiography</li> <li>• Abbreviations</li> </ul>
<b>General English</b>	<ul style="list-style-type: none"> <li>• Spotting Errors / Vocabulary usage / Sentence Completion / Synonyms / Antonyms / Reconstruction of sentences / One word substitution / Idioms &amp; Phrases / Grammar / Correct usage of Articles / Prepositions / Singular and Plural</li> </ul>
<b>Reasoning</b>	<ul style="list-style-type: none"> <li>• Analogy / Classification / Series Completion / Coding-Decoding / Blood Relation / Direction Sense Test / Alphabet Test / Number and Ranking / Puzzle Test / Odd Man out / General Intelligence</li> </ul>
<b>Quantitative Aptitude</b>	<ul style="list-style-type: none"> <li>• Number system / Fraction and Decimals / Simplification / Volume and surface areas / Square roots and Cube roots / Problems based on numbers, Speed, Time and Distance, Simple Interest / Compound Interest / Boats and Streams / Problems on Trains / Percentage - Interest / HCF and LCM / Average / Ratio and Proportion / Time and Work / Problems based on ages / Profit, Loss and Discount, Statistics / Permutations &amp; Combinations / Probability.</li> </ul>

**DETAILED SYLLABUS OF PART B**

<b>Post Code</b>	<b>Name of Posts</b>	<b>Syllabus - Discipline related (Part B)</b>
A14	Safety Supervisor	<ul style="list-style-type: none"> <li>● <b>Organisational Skills-</b> Role of a supervisor – Manpower management &amp; resource planning – Work force motivation – Grievance handling at shop floor level – Code of Conduct &amp; Discipline - Importance of time keeping &amp; productivity.</li> <li>● Basic knowledge of computer applications.</li> <li>● <b>Supervisory Duties:-</b> <ul style="list-style-type: none"> <li>➤ <b>Principles of Organization</b> – Principles of organization, authority, responsibility, accountability, delegation, span of control, centralization, unity of command.</li> <li>➤ <b>Motivation</b> – Meaning of motivation, understanding human behavior, factors of motivation, levels of motivation, methods of motivating people, brief on motivation theories.</li> <li>➤ <b>Communication</b> – Purpose of communication, communication process, methods of communication written, oral, audio – visual, report writing, channels of communication namely formal and informal, art of giving instructions, barriers of communication, guidelines for effective communication.</li> </ul> </li> <li>● <b>HSE &amp; IMS-</b> Awareness on Industrial safety &amp; PPEs – Importance of housekeeping – Knowledge of IMS – Quality Standards – 5 S – management of industrial hazardous wastes.</li> </ul> <p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>● Basics of Fire-Physics and Chemistry of fire</li> <li>● Hose, hose fittings, branches and nozzles</li> <li>● Pumps and primers</li> <li>● Portable fire extinguishers, Performance and construction as per IS 15683</li> <li>● Foam and foam making branches</li> <li>● Fixed fire fighting installations</li> <li>● Respiratory supporting systems in fire services (including SCBA set)</li> <li>● Gas fire</li> <li>● Fire service hydraulics</li> <li>● Hazards of Chemicals, MSDS</li> <li>● Storage of hazardous goods, Petroleum etc</li> <li>● Electricity- basic concepts</li> <li>● Different types of extinguishing media</li> <li>● Hydrants and water relay</li> <li>● First aid, Resuscitation and CPR</li> <li>● Sprinkler and drenchers</li> <li>● Building construction- definitions as per NBC part-IV</li> <li>● Important rescue tools</li> <li>● Automatic Fire detection and alarm systems</li> </ul>

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		<ul style="list-style-type: none"> <li>• Fire fighting appliances, Fire prevention and Fire fighting process</li> <li>• Global warming and environmental protection- green house gases and ozone depletion</li> <li>• Factories Act and Rules: Provisions and its importance, New amendments.</li> <li>• Safety Principles: Hierarchy of controls, Accident triangle, Accident Investigation.</li> <li>• Working Conditions: Hot work, Confined space, Work at height management etc.</li> <li>• Occupational health and safety management: Existing concepts, Standard provisions, About standards.</li> <li>• PPEs and Safety gadgets: Standards, PPEs for the activities.</li> <li>• Safety Performance Parameters: Proactive and reactive Monitoring indicators of OHS managements.</li> </ul>
A15	<b>Draftsman (Mechanical-Hull)</b>	<p><b><u>Basic Mechanical Engineering:</u></b></p> <ul style="list-style-type: none"> <li>• Importance of IC Engines – Classification, working, two stroke engines, four stroke engines, petrol &amp; diesel engines.</li> <li>• Various power plants: classification, working of Hydro and Thermal power plants</li> </ul>
A16	<b>Draftsman (Mechanical-Machinery Outfit)</b>	<p><b><u>Engineering Graphics:</u></b></p> <ul style="list-style-type: none"> <li>• Importance of engineering graphics – Development of Engineering graphics and CAD</li> <li>• Drawing Standards: Drawing sheet size, types of lines</li> <li>• Dimensioning: Dimensioning standards, notations used in engineering drawing</li> <li>• Geometric construction – principles of Geometric construction</li> <li>• Projections of Points, Lines and planes</li> <li>• Orthographic projections – Principles of orthographic projections</li> <li>• Sectional Views</li> <li>• Pictorial views</li> <li>• Development of surfaces</li> </ul> <p><b><u>Machine Drawing:</u></b></p> <ul style="list-style-type: none"> <li>• Fastening devices – Different types of Screw threads, Riveted joints, foundation bolts.</li> <li>• Assembly and detailed drawing of coupling joints, bearing and machine parts</li> <li>• Welded joints and piping layout</li> </ul> <p><b><u>Production drawing:</u></b></p> <ul style="list-style-type: none"> <li>• Limits fits and tolerance</li> <li>• Surface roughness</li> <li>• Interpretation of drawings - Shop floor drawings</li> <li>• Process chart</li> </ul>

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		<p><b><u>Manufacturing Process:</u></b></p> <ul style="list-style-type: none"> <li>• Properties, testing and inspection of engineering materials – Destructive testing, NDT, Fatigue &amp; Creep test.</li> <li>• Measuring instruments, gauges and comparators –</li> <li>• Welding: types of welding, advantages and limitations of welding, welding joints, various types of electrodes and its coatings, gas welding, TIG, MIG, Welding defects, testing and inspection of weld joints, soldering and brazing.</li> </ul> <p><b><u>Metallurgy and machine tools:</u></b></p> <ul style="list-style-type: none"> <li>• Manufacturing of metals and alloys: ferrous and non-ferrous metals, types of cast iron, pig iron – blast furnace, cast iron – cupola furnace, chemical composition in steels, alloying elements.</li> <li>• Heat Treatment process: Need of heat treatment, various heat treatment process</li> <li>• Machine tools: Lathe, Drilling, Milling, Grinding etc.</li> <li>• Press tools and their operations – Piercing, blanking etc.</li> <li>• Importance of Jigs and fixtures</li> <li>• Non-conventional machining</li> <li>• Numerically controlled machines</li> </ul> <p><b><u>Refrigeration &amp; Air Conditioning</u></b></p> <ul style="list-style-type: none"> <li>• Principles of refrigeration - Sensible heat, Latent heat, Dew point temp, DBT, WBT, Sp. Humidity, Relative humidity, COP, Carnot cycle</li> <li>• Different type of heat exchangers</li> <li>• Refrigerants</li> <li>• Air conditioning system: Factors governing designing of room air conditioners</li> </ul> <p><b><u>Strength of Materials</u></b></p> <ul style="list-style-type: none"> <li>• Mechanical properties – Hardness, ductility, Malleability, toughness etc</li> <li>• Heat treatment process – Annealing, hardening, tempering</li> <li>• Stress, Strain</li> <li>• Creep, Fatigue</li> <li>• SFD &amp; BMD</li> <li>• Different types of beams and loadings</li> <li>• Elongation due to Temperature difference</li> <li>• Moment of Inertia for geometrical shapes</li> <li>• Section modulus</li> <li>• Relation with Torque and power</li> <li>• Comparison with solid and hollow shaft transmitting same power</li> <li>• Working load, Factor of safety</li> <li>• Springs</li> <li>• Gears – Module, Addendum, gear ratio etc.</li> </ul>

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		<ul style="list-style-type: none"> <li>• Pulleys, Flanges, Key joints, weld joints etc.</li> <li>• Column &amp; struts</li> </ul> <p><b><u>Fluid Mechanics:</u></b></p> <ul style="list-style-type: none"> <li>• Bernoulli's equation</li> <li>• Reynolds number</li> <li>• Hydraulic machines</li> <li>• Venturimeter, orifice meter, pitot tube</li> <li>• Co-efficient of Discharge</li> <li>• Head loss due to frictions</li> <li>• Different types of Flow</li> <li>• Pipes sizes , material , nomenclature</li> <li>• Different types of Pumps</li> <li>• Velocity triangle</li> <li>• Water hammer</li> </ul> <p><b><u>Computer Aided Engineering Drawing</u></b></p> <p><b><u>Introduction to Computer Aided Drawing</u></b>            Standard menus/toolbars, navigational tools, Co-ordinate systems. Selection of drawing size and scale, creation of line using draw commands, co-ordinate points draw commands-line, ray, spline, arc, circle, ellipse, polygons, rectangle, polyline, text editing commands-erase, copy, move, offset, mirror, rotate, trim, extend, , break, chamfer, fillet etc</p> <p><b><u>Dimensioning systems</u></b>            Method of dimensioning diameters, radii, chords, arc and angles, surface symbols.            Aligned and uni-directional system, Dimension-commands (Standard drawings to be supplied, draw and dimension using various systems)</p> <p><b><u>Orthographic Projections</u></b>            Four quadrants, principal planes, projectors, objects, profile plane, designation of views, projection of a point in all quadrants, projection of straight lines and true lengths, projection of laminas like triangular, square, pentagonal, hexagonal and circular in different positions.</p> <p><b><u>Isometric Projections</u></b>            Isometric scale, isometric projection of regular objects like cube, prism, pyramids, cone, cylinders and sphere. Isometric projection of step block, v-block, cross, sphere above the frustum of a cone and built up solids.</p> <p><b><u>Fasteners</u></b>            Temporary fastenings - screw threads, bolts and nuts            Screw threads - conventional symbols for representation of internal and external threads- metric threads - left hand and right hand - multi starts threads</p>

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A17	<b>Draftsman (Electrical)</b>	<p><b><u>Basic Electrical</u></b> - Ohm's law, Kirchhoff's laws – solution of series and parallel circuits  Magnetic circuits: Flux, MMF, reluctance, electromagnetic induction, Faraday's laws, Lenz's law, statically and dynamically induced emfs, self and mutual induction, co-efficient of coupling.  Network theorems – Thevenin, reciprocity, superposition, reciprocity, Maximum power transfer theorems  AC Principles - Principle of generation of alternating current – waveforms – frequency, Amplitude, Cycle, period, average and rms values, form factor, Peak factor, power , power factor  Generation of 3 phase ac voltage, star and delta connections, voltage &amp; current relationships in star and delta.</p> <p><b><u>Measuring Instruments</u></b> - Ammeter and voltmeters-M.I instruments, Moving coil and Induction type - construction, operation, range, errors, advantages &amp; disadvantages, applications. Wattmeter, Energy meter, Galvanometer  Range extension of meters, CT and PT principle of operation and application  Transducers – different types , working and applications  Secondary cells and batteries, earthing: Meaning of earthing, its necessity and importance. Types of earthing. Materials used and their specifications. Points need to be earthed.</p> <p><b><u>Electrical Machines</u></b>  DC generators – Working principle of D.C. generator, construction and types, windings, Armature reaction, commutation, characteristics, efficiency and voltage regulation  DC Motors – Construction and working principle of D.C. motor, types, torque, characteristic, speed control, starting devices  Alternators- Construction and working principle, armature winding, EMF equation, Armature reaction, voltage regulation, excitation systems, parallel operations, hunting, cooling  Transformers – Working principle, EMF equation, Operation on No load and on load, regulation and efficiency, three phase transformer, cooling , Autotransformer, parallel operation  Induction Motors- Working principle, types, torque-slip curves, power output, starting: necessity and types, speed control, induction generators  Synchronous motors- Working principle, characteristics, hunting, starting methods, application</p> <p><b><u>Protection</u></b>  Circuit breakers – Principle of Arc extinction, Types, rating Fuses, Protection of transformer, Alternator, bus bar</p> <p><b><u>Electronics</u></b>  Semiconductors, diodes, transistors, half wave rectifier, full wave rectifier, oscillators, OPAMP, flip flops, shift register, counters, encoder, decoder, Multiplexer, de multiplexer, D/A and A/D convertors</p>

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		<p><b>Computer Aided Engineering Drawing</b>  <b>Introduction to Computer Aided Drawing:</b> standard menus/toolbars, navigational tools, Co-ordinate systems. Selection of drawing size and scale, creation of line using draw commands, co-ordinate points draw commands-line, ray, spline, arc, circle, ellipse, polygons, rectangle, polyline, text editing commands-erase, copy, move, offset, mirror, rotate, trim, extend, break, chamfer, fillet etc</p> <p><b>Dimensioning systems</b>  Method of dimensioning diameters, radii, chords, arc and angles, surface symbols.  Aligned and uni-directional system, Dimension-commands (Standard drawings to be supplied, draw and dimension using various systems)</p> <p><b>Orthographic Projections</b>  Four quadrants, principal planes, projectors, objects, profile plane, designation of views, projection of a point in all quadrants, projection of straight lines and true lengths, projection of laminas like triangular, square, pentagonal, hexagonal and circular in different positions.</p> <p><b>Isometric Projections</b>  Isometric scale, isometric projection of regular objects like cube, prism, pyramids, cone, cylinders and sphere. Isometric projection of step block, v-block, cross, sphere above the frustrum of a cone and built up solids.  Electrical symbols of components, measuring instruments, electrical machines and semiconductor devices</p>		
<b>A18</b>	<b>Junior Technical Assistant (Electrical)</b>	1.	Basic electrical engineering	(a) Network theorems and laws (b) Magnetic circuits (c) AC fundamentals (d) RLC circuits
		2.	Static and rotating AC&DC machines	(a) DC generators (b) DC motors (c) Transformers (d) Synchronous generators (e) Synchronous motors (f) Induction motors (g) Single phase motors
		3.	Power system	(a) Generation of electrical power (b) Transmission and distribution (c) Circuit breakers (d) Cables
		4.	Electrical measurements	(a) Moving coil instruments (b) Moving iron instruments (c) Measurement of current, voltage, frequency and energy (d) Bridge circuits



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		5.	Semiconductor Devices	(a) Semiconductors (b) Diodes and power supplies (c) Transistors
		6.	Basic Computer Applications	(a) Hardware and software (b) Operating systems and applications (c) Internet
<b>A19</b>	<b>Junior Technical Assistant (Mechanical)</b>	1.	Manufacturing Processes	(a) Casting (b) Forging (c) Rolling (d) Extrusion (e) Machining including surface finishing
		2.	Welding	(a) Types of welding (b) welding defects (c) Testing of welds (d) Brazing and soldering
		3.	Theory of Machines and Machine Design	(a) Fundamentals and types of machines (b) Common mechanisms (c) Cams and followers (d) Common transmissions (e) Flywheels and governors (f) Brakes, dynamometers, clutches and bearings (g) Balancing and vibration
		4.	Thermal Engineering	(a) Energy sources (b) Fundamentals of thermodynamics (c) Ideal gasses (d) Steam turbines and condensers (e) Heat Transfer
		5.	Applied Mechanics	(a) Forces and moments (b) Friction (c) Centroid and Centre of Gravity (d) Simple machines, pulleys, blocks and wheels (e) Kinetics (f) Kinematics (g) Work, power, energy
		6.	Metallurgy and Material Properties	(a) Physical, Mechanical, Thermal, Electrical, Magnetic Properties etc (b) Effect of heat treatment (c) Surface hardness and hardening (d) Corrosion (e) Testing of metals (f) Lubricants and their properties



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		7.	Strength of Materials (a) Stress and strain (b) Bending and shear forces (c) Bending and shear stress (d) Moment of Inertia (e) Torsion
		8.	Fluid Mechanics (a) Properties of liquids (b) Fluid dynamics (c) Classification of fluids (d) Laws related with fluid flow and dynamics (e) Turbines
		9.	Basic Computer Applications (a) Hardware and software (b) Operating systems and applications (c) Internet
		10.	Basics of Electrical Engineering and Power Generation (a) Electrical power generation, transmission and distribution (b) AC fundamentals (c) Measuring instruments (d) DC motors (e) AC appliances (f) Utilisation of electrical energy (g) Electrical safety
		11.	Industrial Management (a) Management process (b) Organisational Management (c) Human resource management (d) Material Management
		12.	Metrology and Instrumentation (a) Classification of instruments - range and span, accuracy and precision, reliability, calibration, hysteresis and dead zone, drift, sensitivity, threshold and resolution, repeatability and reproducibility, linearity, speed of response, fidelity and dynamic errors, overshoot. (b) Measurement of error- classification of errors, environmental errors, signal transmission errors, observation errors, operational errors. (c) Transducers : Classification of transducers- active and passive, resistive, inductive, capacitive, piezo, resistive, thermo resistive (d) Specification, selection and application for pressure, temperature,

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			flow, humidity, displacement, velocity, force, strain, sound. (e) Control Systems (f) Measurement of displacement, flow, temperature, strain, miscellaneous. (g) Limits, fits, tolerances and gauges (h) Screw thread measurement (i) Surface finish measurement
		13.	Construction and functioning of various machines (a) Pumps (b) Compressors (c) Boilers (d) Turbines (e) IC Engines (f) Purifiers and separators (g) Hydraulic machinery and lifting equipment etc
		14.	Refrigeration and Air-conditioning (a) Basics of refrigeration (b) Refrigeration cycles (c) Refrigerants (d) Components of a refrigeration system (e) Air conditioning (f) Air conditioning Systems (g) Air Distribution Systems
<b>A20</b>	<b>Assistant</b>	<ul style="list-style-type: none"> <li>• Office procedures, office correspondence,</li> <li>• Record keeping and maintenance of files, Act and Regulations,</li> <li>• Use and application of computer in office, Data entry, computer network, computer devices, operating systems, Windows, MS Word, MS Excel,</li> <li>• Computer maintenance,</li> <li>• Office stationery, paperless office,</li> <li>• ERP,</li> <li>• Duties and responsibilities of Commercial Assistants,</li> <li>• E-commerce,</li> <li>• Environment,</li> <li>• Communicative English,</li> <li>• Business Communication,</li> <li>• Accountancy,</li> <li>• Desktop Publishing,</li> <li>• Data storage,</li> <li>• Cyber security</li> </ul>	