

**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**

Sl No	Name of Post	Syllabus – Discipline related (Part B)
1.	<b>Senior Ship Draftsman (Mechanical)</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> <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> <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> </ul>

Sl No	Name of Post	Syllabus – Discipline related (Part B)
		<ul style="list-style-type: none"> <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> <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) 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>

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		<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>
2.	<b>Senior Ship Draftsman (Electrical)</b>	<p><b><u>Basic Electrical</u></b> - Ohm's law, Kirchoff'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, coefficient 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.  <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.  <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  <b><u>Protection</u></b>            Circuit breakers – Principle of Arc extinction, Types, rating Fuses, Protection of transformer, Alternator, bus bar  <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  <b><u>Computer Aided Engineering Drawing</u></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  <b><u>Dimensioning systems</u></b></p>

Sl No	Name of Post	Syllabus – Discipline related (Part B)
		<p>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 frustrum of a cone and built up solids. Electrical symbols of components, measuring instruments, electrical machines and semiconductor devices</p>
3.	<b>Senior Ship Draftsman (Electronics)</b>	<p><b><u>Basic Electrical Engineering-</u></b> AC and DC fundamentals, Basic working of AC and DC motors, Transformers, AC/ DC motor starting &amp; speed control techniques, Basic working principle of Generators, Alternators, basic power electronics, Generation of electrical power, Transmission and distribution, Protection and safety devices.</p> <p><b><u>Basic Electronics &amp; communications systems</u></b> –Semiconductors &amp; solid-state physics, Active &amp; passive devices, Integrated circuits &amp; logic gates, Amplifier &amp; oscillators, Linear integrated circuits, Digital circuits, microprocessors, microcontrollers. Wave propagation, antennas, modulation techniques, Radio transmitters &amp; receivers, optic fibre communication, Industrial electronics.</p> <p><b><u>Basic Instrumentation Theory-</u></b> Analog and digital transducers, Oscilloscope, Multimeters, signal analysers, data recorders, open loop and close loop systems, telemetry.</p> <p><b><u>Basic Computer Applications-</u></b> Hardware and software, Operating systems and applications, Internet, Networking</p> <p><b><u>Computer Aided Engineering Drawing</u></b> -Introduction to Computer Aided Drawing, Dimensioning systems, Projections- Orthographic, Isometric, IEC/IEEE symbols for electronic components, communication systems.</p>
4.	<b>Senior Ship Draftsman (Instrumentation)</b>	<p><b><u>Basic Electrical Engineering-</u></b> AC and DC fundamentals, Basic working of AC and DC motors, Transformers, AC/ DC motor starting &amp; speed control techniques, Basic working principle of Generators, Alternators, basic power electronics, Generation of electrical power, Transmission and distribution, Protection and safety devices.</p> <p><b><u>Basic Electronics</u></b> - Semiconductors &amp; solid-state physics, Active &amp; passive devices, Integrated circuits &amp; logic gates, Amplifier &amp; oscillators, Boolean algebra, Digital circuits, microprocessors, microcontrollers.</p> <p><b><u>Basic Instrumentation Theory-</u></b> Measurement of temperature, pressure, humidity, velocity, flow, level, pH, viscosity, acceleration, various types of transducers, introduction to hydraulics &amp; pneumatics system and components, measurement of electrical parameters.</p> <p><b><u>Basic Control Theory-</u></b> Closed loop &amp; open loop systems, servos, synchros, stepper motors, PID controllers, PLC, DCS, SCADA</p> <p><b><u>Basic Computer Applications-</u></b> Hardware and software, Operating systems and applications, Internet, Networking</p> <p><b><u>Computer Aided Engineering Drawing</u></b> - Introduction to Computer Aided Drawing, Dimensioning systems, Projections- Orthographic, Isometric, ISA symbols of instrumentation &amp; automation components, measuring instruments, electrical machines and hydraulic and pneumatic components.</p>

Sl No	Name of Post	Syllabus - Discipline related (Part B)		
5.	<b>Junior Technical Assistant (Mechanical)</b>	(i)	Manufacturing Processes	(a) Casting (b) Forging (c) Rolling (d) Extrusion (e) Machining including surface finishing
		(ii)	Welding	(a) Types of welding (b) welding defects (c) Testing of welds (d) Brazing and soldering
		(iii)	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
		(iv)	Thermal Engineering	(a) Energy sources (b) Fundamentals of thermodynamics (c) Ideal gasses (d) Steam turbines and condensers (e) Heat Transfer
		(v)	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
		(vi)	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
		(vii)	Strength of Materials	(a) Stress and strain (b) Bending and shear forces (c) Bending and shear stress (d) Moment of Inertia (e) Torsion
		(viii)	Fluid Mechanics	(a) Properties of liquids (b) Fluid dynamics (c) Classification of fluids (d) Laws related with fluid flow and dynamics (e) Turbines
		(ix)	Basic Computer Applications	(a) Hardware and software (b) Operating systems and applications (c) Internet
		(x)	Basics of Electrical Engineering and Power Generation	(a) Electrical power generation, transmission and distribution (b) AC fundamentals

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				(c) Measuring instruments (d) DC motors (e) AC appliances (f) Utilisation of electrical energy (g) Electrical safety
		(xi)	Industrial Management	(a) Management process (b) Organisational Management (c) Human resource management (d) Material Management
		(xii)	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, 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
		(xiii)	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
		(xiv)	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
6.	<b>Junior Technical Assistant (Electrical)</b>	(i)	Basic electrical engineering	a) Network theorems and laws b) Magnetic circuits c) AC fundamentals d) RLC circuits
		(ii)	Static and rotating AC&DC machine	a) DC generators b) DC motors c) Transformers

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				d) Synchronous generators e) Synchronous motors f) Induction motors g) Single phase motors
		(iii)	Power system	a) Generation of electrical power b) Transmission and distribution c) Circuit breakers d) Cables
		(iv)	Electrical measurements	a) Moving coil instruments b) Moving iron instruments c) Measurement of current, voltage, frequency and energy d) Bridge circuits
		(v)	Semiconductor Device	a) Semiconductors b) Diodes and power supplies c) Transistors
		(vi)	Basic Computer Applications	a) Hardware and software b) Operating systems and applications c) Internet
7.	<b>Junior Technical Assistant (Electronics)</b>	(i)	Circuit Fundamentals	Passive Circuit elements, Ohm's Law, Energy Sources, DC and AC Fundamentals, Tuning Circuits and Filters, Electrostatics, Faraday's Laws and Lenz's laws.
		(ii)	Solid State Physics	Conductors, Semiconductors and Insulators.
		(iii)	Active and Passive Devices in circuits, Switching circuits	Resistors, Capacitors, Diodes, Special Diodes, Transistors, FET, Thyristors, DIAC, TRIAC, Optoelectronics Devices, IGBT, switching Applications.
		(iv)	Amplifiers and Oscillators	Single Stage and Multistage Amplifiers, Feedback amplifier, Sinusoidal and non-sinusoidal Oscillators.
		(v)	Integrated Circuits and Logic Gates	Basic gates and equivalent circuits, Adders, Subtractors, Op-Amp, Flip Flops.
		(vi)	Transducers	Hall Effect, Classification/Types and working-LVDT, proximity sensors, piezoelectric transducers, working of Load cell.
		(vii)	Electronic Instruments	Analog and Digital Instruments, Multimeter, Voltmeter, Ammeter, CRO.
		(viii)	Power Supplies	Unregulated and Regulated Power Supply, Rectifiers, SMPS, UPS.
		(ix)	Number Systems, Boolean Algebra	Decimal and Binary number systems- Conversion problems, Laws of Boolean Algebra.
		(x)	Digital Circuits and Microprocessors	Digital logic families: TTL, MOS, Combinational circuits: multiplexer/ demultiplexer, encoder/ decoder, adder/subtractor, comparator, counters and parity generators; Sequential circuits: latches



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				and flip-flops (RS, JK, D, T, and Master Slave); Registers; Counters: ripple, ring, and shift register counters; PLC- working with sensor and actuators, PLC programming, Microprocessors: 8085 and 8086, Ladder Diagram, RAM, ROM, Choppers, Inverters and Cyclo converters.
		(xi)	Principles of Communication	Modulation and De-modulation types, FSK, PSK, TDMA, FDMA, CDMA. Electromagnetic Spectra, Basic principles of Fibre Optic Communication.
		(xii)	AV Systems	Microphones, Loudspeakers, Stereo system, Dolby system, Tuners, IF and RF Amplifiers, Digital TV, CCTV, Frequency, Phase and Amplitude Distortion, Mixers, audio-video formats.
		(xiii)	Ship Communication Equipments	GMDSS, marine VHF, RADAR, INMARSAT Equipment, Antennas in Ship.
		(xiv)	Basic Electricals	AC and DC fundamentals, Basic working of AC and DC motors classification, Transformers, AC/ DC motor speed control techniques, Basic working principle of Generators, Alternator, Rectifiers and invertors, Star and delta starters.
		(xv)	Energy Conservation	Renewable sources of energy, VFD for industrial use.
		(xvi)	Basic Computer Applications	Hardware and software, Operating systems and applications, Internet.
8	<b>Junior Technical Assistant (ABAP)</b>	<ul style="list-style-type: none"> <li>➤ ERP fundamentals</li> <li>➤ SAP R/3 technical details</li> <li>➤ Internal tables</li> <li>➤ ABAP Dictionary ,DDIC, Data Types and Data Objects</li> <li>➤ Programming guidelines &amp; Performance tuning</li> <li>➤ (including SQL trace tool &amp; runtime analysis, code inspector etc)</li> <li>➤ Database</li> <li>➤ Database table operations</li> <li>➤ Extract datasets</li> <li>➤ Generation of various types of reports, ALV, classical reports, Simple and interactive reporting and other Reporting options</li> <li>➤ Selection screen</li> <li>➤ Creation of module pool programs <ul style="list-style-type: none"> <li>• Designing screens using various screens elements</li> <li>• Navigation in between multiple screens</li> <li>• Table control</li> <li>• Screen painter</li> <li>• Menu painter</li> <li>• Creation of menu bar, tool bar, title bar etc.,</li> <li>• Sub screen, Tab strips</li> </ul> </li> <li>➤ ABAP debugging</li> <li>➤ SAP Scripts</li> <li>➤ Smart forms</li> <li>➤ Adobe forms</li> <li>➤ BDC (batch data communication)</li> <li>➤ LSMW(Legacy System Migration Workbench)</li> <li>➤ Object Oriented programming, Message class</li> </ul>		

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		<ul style="list-style-type: none"> <li>➤ Authorization objects</li> <li>➤ SAP Query, info set, Quickviewer</li> <li>➤ Functional Modules</li> <li>➤ BAPI</li> <li>➤ BADI'S</li> <li>➤ User Exits</li> <li>➤ Enhancements</li> <li>➤ Web Dynpro for ABAP               <ul style="list-style-type: none"> <li>• Controllers</li> <li>• Context</li> <li>• View</li> <li>• Assistance class</li> <li>• Value help</li> <li>• UI elements</li> <li>• Component reuse</li> </ul> </li> <li>➤ Workflow               <ul style="list-style-type: none"> <li>• Workflow configuration</li> <li>• Workflow tasks</li> <li>• Workflow administration</li> </ul> </li> <li>➤ SAP module knowledge - SD ,PS,FICO, MM,QM,HCM etc and other relevant modules</li> <li>➤ Should have understanding of Data structure and Data tables of different modules of SAP e.g. MM, PM, PS, SD, HCM, FICO, SRM etc</li> <li>➤ Understanding Functional specification and designing technical specification</li> <li>➤ Code review techniques</li> <li>➤ Unit Testing</li> <li>➤ Transport and workbench request</li> <li>➤ Transport organizer</li> <li>➤ Version management</li> <li>➤ UI5, HANA , Fiori</li> <li>➤ <u>CROSS APPLICATIONS</u> <ul style="list-style-type: none"> <li>• RFC (Remote Function Calling)</li> <li>• ALE (Application Link Enabling)</li> <li>• IDOC</li> <li>• EDI (Electronic Data Interchange)</li> <li>• PI Proxy</li> </ul> </li> </ul>		
9	Laboratory Assistant (Mechanical)	(i)	Production Technology	(a) Casting (b) Forging (c) Rolling (d) Extrusion
		(ii)	Manufacturing Processes	(a) Machining including surface finishing (b) Conventional & Non conventional machining (c) Thermal Aspects in Machining
		(iii)	Welding	(a) Types of welding (b) welding defects (c) Testing of welds (d) Brazing and soldering
		(iv)	Metallurgy and Material Properties	(a) Physical, Mechanical, Thermal, Electrical, Magnetic Properties etc (b) Effect of heat treatment (c) Surface hardness and hardening (d) Corrosion

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			(e) Lubricants and their properties
		(v) Strength of Materials	(a) Stress, strain and deformation of solids (b) Bending and shear forces (c) Bending and shear stress (d) Moment of Inertia (e) Torsion
		(vi) Metals & Alloys	(a) Classification of Steels (b) Alloy Steels & their properties (c) Cast Irons (d) Important Non ferrous metals & their composition
		(vii) Material Testing	(a) Tensile Test (b) Hardness test (c) Impact Test (d) Bend Test (e) Fracture Test (f) Non Destructive Test
		(viii) Fuels	(a) Solid Fuels (b) Liquid Fuels (c) Secondary Liquid Fuels (d) Gaseous Fuels (e) Combustion
		(ix) Basic Computer Applications	(a) Hardware and software (b) Operating systems and applications (c) Internet
		(x) Industrial Management	(a) Management process (b) Organisational Management (c) Human resource management (d) Material Management
		(xi) Quality Management	(a) Quality Policy (b) Quality Objectives (c) Control of documents (d) Corrective & Preventive action (e) Risks & Opportunities
		(xii) 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, flow, humidity, displacement, velocity, force, strain, sound.
10	Laboratory Assistant	(i) Quantitative analysis	(a) Volumetric method (b) Gravimetric method

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	(Chemical)		(c) Normality (d) Molality (e) Molarity
		(ii) Periodic Table	(a) Electropositivity (b) Electronegativity (c) Metallic character (d) Non Metallic character (e) Hydrogen bonding
		(iii) Nuclear Chemistry	(a) Natural radioactivity (b) Modes of decay (c) Artificial transformation (d) Nuclear fission
		(iv) Chemical Bonding	(a) Ionic Bond (b) Polarity of covalent bond (c) Metallic bonding (d) Hybridisation
		(v) Analysis of water	(a) Acidity (b) Alkalinity (c) Hardness (d) pH (e) Causes of Hardness (f) Temporary & Permanent Hardness
		(vi) Metals & Alloys	(a) Classification of Steels (b) Alloy Steels & their properties (c) Cast Irons (d) Important Non ferrous metals & their composition
		(vii) Instrumental methods of analysis	(a) Atomic Absorption Spectroscopy (b) Flame Emission Spectroscopy (c) Law of Spectrophotometry
		(viii) Fuels	(a) Solid Fuels (b) Liquid Fuels (c) Secondary Liquid Fuels (d) Gaseous Fuels (e) Combustion
		(ix) Basic Computer Applications	(a) Hardware and software (b) Operating systems and applications (c) Internet
		(x) Quality Management	(a) Quality Policy (b) Quality Objectives (c) Control of documents (d) Corrective & Preventive action (e) Risks & Opportunities
11.	<b>Storekeeper</b>	<b><u>Theoretical and application knowledge on</u></b> <b>A. Stores /Warehouse Management</b> <ul style="list-style-type: none"> <li>• Objectives, Functions &amp; responsibilities of Store keeping</li> <li>• Types of Stores</li> <li>• Storage Systems &amp; Layout</li> <li>• Store Management Functions - processes and procedures</li> <li>• Storage of hazardous materials and its management</li> <li>• Category Management- classification and codification</li> <li>• Stock Verification Methods</li> </ul>	

Sl No	Name of Post	Syllabus – Discipline related (Part B)
		<ul style="list-style-type: none"> <li>• Material Handling Methods and Equipments</li> <li>• Importance of Documentation</li> <li>B. <u>Inventory Management</u> <ul style="list-style-type: none"> <li>• Functions of inventory</li> <li>• Classification of inventory</li> <li>• Costs associated with inventory</li> <li>• Inventory control methods (like ABC, FSN, VED analysis etc )</li> </ul> </li> <li>C. <u>5S Methodology of housekeeping</u> <ul style="list-style-type: none"> <li>• Objectives and importance</li> <li>• 5S in practical applications</li> </ul> </li> <li>D. <u>Computer Literacy, MS Office &amp; E-mail (2007 &amp; higher versions)</u> <ul style="list-style-type: none"> <li>• Windows Basics</li> <li>• MS Excel Basics</li> <li>• MS Word Basics</li> <li>• Email – basics and applications</li> </ul> </li> <li>E. <u>ERP – Basics</u> <ul style="list-style-type: none"> <li>• Objectives and importance</li> <li>• Functions</li> <li>• Different ERP Systems like SAP and relevant modules with reference to material procurement</li> </ul> </li> <li>F. <u>ISO 9001, 14001 &amp; OHSAS 18001 - Objectives and importance</u></li> <li>G. <u>Customer Relationship Management in stores</u> – Basics, Objectives and importance, Applications</li> </ul>
12	<b>Junior Commercial 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, Office stationery, paperless office,</li> <li>• ERP,</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>
13	<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>• E-commerce,</li> <li>• Environment,</li> <li>• Communicative English,</li> <li>• Business Communication,</li> <li>• Accountancy,</li> <li>• Desktop Publishing,</li> </ul>

Sl No	Name of Post	Syllabus – Discipline related (Part B)
		<ul style="list-style-type: none"> <li>• Data storage,</li> <li>• Cyber security.</li> </ul>
14.	<b>Welder Cum Fitter (Welder/Welder (Gas&amp; Electric))</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>• Principle of welding</li> <li>• Welding positions &amp; WPS/PQR/WPQ</li> <li>• Weld joint nomenclature and welding symbols</li> <li>• Welding and cutting tools</li> <li>• Welding techniques</li> <li>• Welding defects and remedial actions</li> <li>• Specification of Welding rods as per AWS</li> <li>• Gouging methods</li> <li>• Welding of Carbon steel/Al/Austenetic SS/High strength low alloys</li> <li>• Pipe welding – Cu, Ni and SS material</li> <li>• Modern welding procedures – SAW/ TIG/ CO2/ Electro gas welding</li> <li>• FCAW process with ceramic backing</li> <li>• One side welding for panel welding</li> <li>• Testing of weld joints</li> <li>• Safety procedures/First aid</li> <li>• Types of material handling equipments</li> </ul>
15.	<b>Welder Cum Fitter (Plumber)</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>• Tools -Marking /Fitting / Fastening</li> <li>• Marking and developing</li> <li>• Method of joining - Welding/Soldering/Brazing</li> <li>• Pipe fittings/joints and their usage</li> <li>• Pipe Classes and Grades</li> <li>• Properties of Steel/Alloys</li> <li>• Numerical ability - Mass/Volume/Density/unit conversion/unit system/ Ratio/ Proportion/ Mensuration</li> <li>• Material estimation for the piping layout</li> <li>• Piping symbols</li> <li>• Template and their preparation</li> <li>• Hydrostatic/hydraulic testing of Piping systems</li> <li>• Erection of piping systems and valves</li> <li>• Pipe fastening methods and bending of pipes</li> <li>• Safety procedures /First aid</li> <li>• Types of material handling equipments</li> </ul>
16.	<b>Welder Cum Fitter (Mechanic Motor Vehicle /Mechanic Diesel)</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>• Tools - Bench wise/Files etc</li> <li>• Marking and measuring tools</li> <li>• Limits/Fits/Tolerance</li> <li>• Numerical ability – Mass/Volume/Density/unit conversion/unit system</li> <li>• Shaft alignment</li> <li>• Erection &amp; commissioning of equipments</li> <li>• Valve timing/Tappet clearance</li> <li>• Decarbonising</li> <li>• Fasteners and torque tightening</li> <li>• Engine systems</li> <li>• Engine type and functions</li> <li>• I/C Engines and its parts</li> <li>• Types of bearings and its uses</li> <li>• Safety procedures /First aid</li> </ul>

Sl No	Name of Post	Syllabus – Discipline related (Part B)
		<ul style="list-style-type: none"> <li>Types of material handling equipments</li> </ul>
17.	<b>Welder Cum Fitter (Fitter)</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>Tools Bench wise/Files etc</li> <li>Marking and measuring tools</li> <li>Limit/Fits/Tolerance</li> <li>Numerical ability – Mass/Volume/density/unit conversion/unit system</li> <li>Physical properties of metals and specific usage</li> <li>Methods for removing the broken nuts</li> <li>Drilling /reaming/horning/Counter sinking</li> <li>Types of nuts and locking devices</li> <li>Types of valves and maintenance</li> <li>Bearings and pulleys</li> <li>Overhauling of machineries</li> <li>Types of maintenance</li> <li>Shaft alignment and shaft sighting</li> <li>Bedding or Chocking of machinery foundations</li> <li>Safety procedures /First aid</li> <li>Types of material handling equipments</li> </ul>
18.	<b>Welder Cum Fitter (Sheet Metal Worker)</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <ul style="list-style-type: none"> <li>Sheet metal terms like folding/bending/seaming etc</li> <li>Steel plates and its grades</li> <li>Welding- types of welding - distortion and remedies</li> <li>Line heating</li> <li>Metals and alloys- Characteristics</li> <li>SM methods/tools/ usage</li> <li>Types of Sheet Metal joints and specific usage</li> <li>Methods of laying out pattern/Development</li> <li>Alignment and fit up of plates/blocks using plates of various thicknesses</li> <li>Oxy acetylene / plasma cutting</li> <li>Plate/pipe weld joint configuration</li> <li>Safety procedures/First aid</li> <li>Types of material handling equipments</li> </ul>
19.	<b>Fitter (Electrical)</b>	<p><b><u>Theoretical and application knowledge on</u></b></p> <p><b><u>Fundamentals of electricity:</u></b> various laws of electricity and its applications, Basic electrostatics &amp; electro dynamics, primary and secondary cells, magnetic and capacitive circuits, power and power factor, polyphase system, measuring instruments, measurement of power and energy.</p> <p><b><u>Electrical appliances and wiring:</u></b></p> <ul style="list-style-type: none"> <li>domestic appliances- lighting, various types of lamps, wiring circuits.</li> <li>domestic and industrial, earthing, regulated power supply, maintenance of domestic appliances, IEE rules.</li> </ul> <p><b><u>Electrical machines:</u></b> D.C generators &amp; DC motors characteristics and applications, speed control and testing, transformers&amp; autotransformers- losses and testing, alternators, single phase&amp; 3 phase motors, starter and internal connection diagrams.</p> <p><b><u>Basic electronics:</u></b> active and passive electronic components, rectifier circuits, characteristics of transistors, amplifiers, OPAMP, oscillators, types and application of SCR,UJT, TRIAC, DIAC, microprocessor etc, digital electronics.</p> <p><b><u>Winding of machines:</u></b> fundamental terms used in windings, winding of transformers, motors, armature winding, material used, and method of connection.</p> <p><b><u>Electrical Switchgear:</u></b> principle, operation &amp; application of Fuses, MCCB, Protective relays, ELCB.</p> <ul style="list-style-type: none"> <li>safety for handling electrical equipments/ wiring/ applications</li> <li>Statutory requirements while handling electrical applications.</li> </ul>
20.	<b>Fitter</b>	<ul style="list-style-type: none"> <li>Theoretical and application knowledge on</li> </ul>

Sl No	Name of Post	Syllabus – Discipline related (Part B)
	<b>(Electronics)</b>	<ul style="list-style-type: none"> <li>• Difference between conductor, insulator and semiconductor</li> <li>• RC, LC and RLC circuits.</li> <li>• Symbols, working principle and applications of various electronic components like diode, transistor, zener diode, SCR, UJT, FET, Diac, Triac, MOSFET, IGBT.</li> <li>• Half wave and full wave rectifier circuit, Filter circuits and Ripple factor.</li> <li>• Single stage and multi stage amplifier and types of signal.</li> <li>• Boolean Algebra, Logic Gates, Truth tables and Flip Flops</li> <li>• Fundamentals of DC motor, slip ring and squirrel cage induction motor</li> <li>• Speed control of AC/ DC Motors</li> <li>• DOL ,star delta and Soft starters</li> <li>• Concept of DC drives and AC drive(VFD)</li> <li>• PLC and ladder logic basics, Microprocessor controls &amp; I/O Devices</li> <li>• Concept of CCTV and Networking</li> <li>• Power supply, SMPS and UPS</li> <li>• Navigation and Communication Equipments:</li> <li>• GMDSS, Gyro compass, Radar, Echo sounder, GPS and DGPS, Doppler log, AIS, Steering control (Autopilot), various types of Antennas and Band of Frequencies.</li> <li>• PA system, Talk back system, EPABX</li> <li>• Fire alarm system – Conventional and Addressable types</li> <li>• Testing/Measuring Instruments like Oscilloscope, Function generator, Spectrum analyzer, Tachometer, Tong Tester and Megger</li> <li>• Calibration of measuring instruments like Voltmeter, Ammeter, KW meter, Power Factor meter, KWH meter, insulation meter</li> <li>• Battery chargers and Batteries, Serviceability checks &amp;Capacity test of batteries.</li> <li>• ICCP controls ,Anodes and Reference Electrodes</li> <li>• Dynamic Positioning systems.</li> <li>• DA/AD converters</li> <li>• Different types of Proximity switches ,Level switches, Pressure switches &amp; transmitters</li> <li>• Photo diodes and photo transistors, RTD's and Thermocouples</li> <li>• Tacho generators and Encoders</li> <li>• Need of modulation and de-modulation, Type of modulation ,Radio transmitter and receiver</li> <li>• Advantages of FM over AM</li> <li>• SSB receivers.</li> <li>• Satellite communication and micro-wave communication</li> <li>• Positive and Negative Regulators using IC's</li> <li>• Oscillators, PLL's and Synthesizers</li> <li>• Op-Amps using IC 741</li> <li>• Timers using IC555</li> <li>• LCD/LED Displays</li> <li>• TV Receivers and HD systems.</li> <li>• Dish TV systems</li> <li>• Electronics in Welding sets</li> <li>• Various braking systems used in cranes</li> <li>• Speed control of LLTT cranes</li> <li>• Requirement of AVR's in Alternators</li> <li>• Safety measures while handling Electrical and Electronics equipments.</li> </ul>



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		<ul style="list-style-type: none"> <li>• Soldering and De-Soldering Techniques.</li> </ul>
21.	<b>Shipwright Wood</b>	<p><b><u>Theoretical and application knowledge on</u></b>  Wood working terminologies – Wood working machineries (portable &amp; stationary) – its application &amp; routine maintenance. Various hand tools- measuring instruments for wood working and its relative advantages – Wood preservation &amp; seasoning- Timber identification – Defects in timber – Understanding measurements &amp; tolerances – Knowledge of various wood working joints, furniture fabrication appropriate application and their relative merits &amp; demerits – Knowledge of laminate material, hardware items, &amp; its relative merits – Application of adhesives &amp; finishing agents – Knowledge of modern modular assembly &amp; interior architects and model developments &amp; docking including block setting in marine field (Both new building projects &amp; repair).</p> <ul style="list-style-type: none"> <li>• <b><u>Industrial Safety</u></b>  Awareness on Safety &amp; PPEs - Importance of housekeeping.</li> </ul>