Annexure I

DETAILED SYLLABUS OF PART A

Particulars	Syllabus - General (Part A)
General Knowledge	• Facts about India and other countries: Basic facts / Geography / Tourism / Transport systems / Personalities / Places / History / Constitution / Economy / Writers / Literatures / Indian States & Union Territories / International Organizations. • General Science : Branches of studies / Scientific instruments and appliances / Physics / Chemistry / Biology • Sports & Games • Important Events/ Movements / Leaders / Places / Years • Writers – Authors – Biography - Autobiography • Abbreviations
General English	• Spotting Errors / Vocabulary usage / Sentence Completion / Synonyms / Antonyms / Reconstruction of sentences / One word substitution / Idioms & Phrases / Grammar / Correct usage of Articles / Prepositions / Singular and Plural
Reasoning	• Analogy / Classification / Series Completion / Coding-Decoding / Blood Relation / Direction Sense Test / Alphabet Test / Number and Ranking / Puzzle Test / Odd Man out / General Intelligence
Quantitative Aptitude	• 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 & Combinations / Probability.

Annexure I

DETAILED SYLLABUS OF PART B

Post Code	Name of Post	Syllabus – Discipline related (Part B)
A1	**Senior Ship Draftsman (Mechanical)**	**Basic Mechanical Engineering:** • Importance of IC Engines – Classification, working, two stroke engines, four stroke engines, petrol & diesel engines. • Various power plants: classification, working of Hydro and Thermal power plants **Engineering Graphics:** • Importance of engineering graphics – Development of Engineering graphics and CAD • Drawing Standards: Drawing sheet size, types of lines • Dimensioning: Dimensioning standards, notations used in engineering drawing • Geometric construction – principles of Geometric construction • Projections of Points, Lines and planes • Orthographic projections – Principles of orthographic projections • Sectional Views • Pictorial views • Development of surfaces **Machine Drawing:** • Fastening devices – Different types of Screw threads, Riveted joints, foundation bolts. • Assembly and detailed drawing of coupling joints, bearing and machine parts • Welded joints and piping layout **Production drawing:** • Limits fits and tolerance • Surface roughness • Interpretation of drawings - Shop floor drawings • Process chart **Manufacturing Process:** • Properties, testing and inspection of engineering materials – Destructive testing, NDT, Fatigue & Creep test. • Measuring instruments, gauges and comparators – • 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.

Annexure I

Post Code	Name of Post	Syllabus – Discipline related (Part B)
		Metallurgy and machine tools: • 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. • Heat Treatment process: Need of heat treatment, various heat treatment process • Machine tools: Lathe, Drilling, Milling, Grinding etc. • Press tools and their operations – Piercing, blanking etc. • Importance of Jigs and fixtures • Non-conventional machining • Numerically controlled machines **Refrigeration & Air Conditioning** • Principles of refrigeration - Sensible heat, Latent heat, Dew point temp, DBT, WBT, Sp. Humidity, Relative humidity, COP, Carnot cycle • Different type of heat exchangers • Refrigerants • Air conditioning system: Factors governing designing of room air conditioners **Strength of Materials** • Mechanical properties – Hardness, ductility, Malleability, toughness etc • Heat treatment process – Annealing, hardening, tempering • Stress, Strain • Creep, Fatigue • SFD & BMD • Different types of beams and loadings • Elongation due to Temperature difference • Moment of Inertia for geometrical shapes • Section modulus • Relation with Torque and power • Comparison with solid and hollow shaft transmitting same power • Working load, Factor of safety • Springs • Gears – Module, Addendum, gear ratio etc. • Pulleys, Flanges, Key joints, weld joints etc. • Column & struts **Fluid Mechanics:** • Bernoulli's equation • Reynolds number

Annexure I

Post Code	Name of Post	Syllabus – Discipline related (Part B)
		• Hydraulic machines • Venturimeter, orifice meter, pitot tube • Co-efficient of Discharge • Head loss due to frictions • Different types of Flow • Pipes sizes , material , nomenclature • Different types of Pumps • Velocity triangle • Water hammer **Computer Aided Engineering Drawing** **Introduction to Computer Aided Drawing** 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 **Dimensioning systems** 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) **Orthographic Projections** 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. **Isometric Projections** 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. **Fasteners** 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

Annexure I

Post Code	Name of Post	Syllabus – Discipline related (Part B)
A2	**Senior Ship Draftsman (Electrical)**	**Basic Electrical** - 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 & current relationships in star and delta. **Measuring Instruments** - Ammeter and voltmeters-M.I instruments, Moving coil and Induction type - construction, operation, range, errors, advantages & 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. **Electrical Machines** 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

Annexure I

Post Code	Name of Post	Syllabus – Discipline related (Part B)
		Protection Circuit breakers – Principle of Arc extinction, Types, rating Fuses, Protection of transformer, Alternator, bus bar **Electronics** Semiconductors, diodes, transistors, half wave rectifier, full wave rectifier, oscillators, OPAMP, flip flops, shift register, counters, encorder, decoder, Multiplexer, de multiplexer, D/A and A/D convertors **Computer Aided Engineering Drawing** **Introduction to Computer Aided Drawing:** 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 **Dimensioning systems** 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) **Orthographic Projections** 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. **Isometric Projections** 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
A3	**Senior Ship Draftsman (Electronics)**	Basic Electrical Engg. (ohm, V, A, W etc.) Basic Electronics, Network Circuits (series, parallel, resistance, reactance etc.), Electrical Motors, Gates, Amplifier, OPAmp, Oscillator, Signal generator, Diode, Microcontrollers, Microprocessors, Transistors, Basic antenna theory, Antenna types, EMS (freq, wavelength, Communication types), C Program, Digital Electronics, Audio-Video systems, Fibre-optics, Luminance, Doppler effect.

Annexure I

Post Code	Name of Post	Syllabus – Discipline related (Part B)
A4	**Junior Technical Assistant (Safety)**	**Theoretical and application knowledge on** A. Factories Act and Rules: Provisions and its importance, New amendments B. Safety Principles: Hierarchy of controls, Accident triangle, Accident Investigation. C. Working Conditions: Hot work, Confined space, Work at height management etc. D. Occupational health and safety management: Existing concepts, Standard provisions, About standards E. PPEs and Safety gadgets: Standards, PPEs for the activities F. Safety Performance Parameters: Proactive and reactive Monitoring indicators of OHS managements G. Fire: Fire prevention and Fire fighting process