COCHIN SHIPYARD LIMITED
KOCHI 682015
(P&A Department)

No. PERL/2(235)/15-Vol II 26 May 2016

SYLLABUS FOR SUPERVISORY AND WORKMEN SELECTON 2016

1. Refer vacancy notification no. PERL/2(235)/15 dtd 25.01.2016.
2. As per para IV of the vacancy notification referred above, the method of selection for all the notified posts will include **Phase I**, consisting of an Objective type OMR based written test (70 or 30 marks) and **Phase II** (30 or 70 marks), consisting of Descriptive / Skill / Proficiency / Practical / Physical Test.
3. **In Phase I, the question paper for Objective type OMR based written test consists of two parts- General (Part A) and Trade/ Discipline related (Part B).** Part A comprises of General Knowledge, General English, Reasoning and Quantitative Aptitude. The pattern of the question paper, number of questions and allotment of marks is detailed under:

Post Code	Name of post	No. of questions in each section/ marks per section*					Total no. of questions for OMR test / Max marks
		General Knowledge	General English	Reasoning	Quantitative Aptitude	Trade/ Discipline related	
A1	Assistant Engineer (Machinist)	5	5	5	5	50	70
A2	Assistant Engineer (Shipwright Wood)	5	5	5	5	50	70
A3	Assistant Engineer (Painting)	5	5	5	5	50	70
A4	Assistant Catering Officer	5	5	5	5	50	70
A5	Accountant	5	5	5	5	50	70
B1	Technical Assistant	5	5	5	5	50	70
B2	Junior Technical Assistant	5	5	5	5	50	70
B3	Senior Ship Draftsman	5	5	5	5	50	70
B4	Junior Commercial Assistant	5	5	5	5	50	70
B5	Stenographer	5	5	5	5	50	70
B6	Store Keeper	5	5	5	5	50	70
B7	Instrument Mechanic	5			5	20	30
B8	Welder Cum Fitter	5			5	20	30
B9	Fitter (Electrical)	5			5	20	30
B10	Fitter (Electronics)	5			5	20	30
B11	Painter	5			5	20	30
B12	Shipwright Wood	5			5	20	30
B13	Machinist	5			5	20	30
B14	Crane Operator (Electrical)	5			5	20	30
B15	Crane Operator (Diesel)	5			5	20	30
B16	Serang	5				25	30
B17	Fireman	5			5	20	30

Post Code	Name of post	No. of questions in each section/ marks per section*					Total no. of questions for OMR test /Max marks
		General Knowledge	General English	Reasoning	Quantitative Aptitude	Trade/ Discipline related**	
B18	Semi Skilled Rigger	5				25	30
B19	Staff Car Driver	5			5	20	30
B20	Lascar (Floating Craft)	5				25	30
B21	Service Assistant (Office)	5				25	30
B22	General Worker (Canteen)	5			5	20	30
*Each question carries one mark. There will be no negative marks. **Syllabus for part A and part B at paras 4 and 5 below.							

4. The detailed syllabus of Part A is as under:

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.

5. Part B is based on each trade/ discipline , syllabus is as detailed under:

Sl No	**Name of Post**	**Syllabus - Trade / Discipline related (Part B)**
A1	**Assistant Engineer (Machinist)**	• **HSE & IMS-** Awareness on Industrial safety & PPEs – Importance of house keeping – Knowledge of IMS – Quality Standards – 5 S – management of industrial hazardous wastes • Basic knowledge of computer applications

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		• **Organisational Skills-** Role of a supervisor – Manpower management & resource planning – Work force motivation – Grievance handling at shop floor level – Code of Conduct & Discipline - Importance of time keeping & productivity. **Theoretical and application knowledge on** • Measurement tools (Vernier, dial gauges etc.) • Lathe, Drilling & Milling machines • Tools nomenclature • Bench tools • Drawings and standards (Limit, fit, clearances etc) • Metallurgy (Materials related to Ship Building) • Quality standards (ISO, IMS, etc) • Industrial safety
A2	**Assistant Engineer (Shipwright Wood)**	• **HSE & IMS-** Awareness on Industrial safety & PPEs – Importance of house keeping – Knowledge of IMS – Quality Standards – 5 S – management of industrial hazardous wastes • Basic knowledge of computer applications • **Organisational Skills-** Role of a supervisor – Manpower management & resource planning – Work force motivation – Grievance handling at shop floor level – Code of Conduct & Discipline - Importance of time keeping & productivity. • **Trade Theory & Knowledge of Trade Applications** Wood working terminologies –Wood working machineries (portable & stationary) – its application & routine maintenance. Various hand tools- measuring instruments for wood working and its relative advantages —– Understanding measurements & tolerances – Timber identification- Defects in timber - Wood preservation & seasoning – Knowledge of various wood working joints, furniture fabrication- appropriate application and their relative merits & demerits – Knowledge of laminate material, hardware items & its relative merits – Application of adhesives & finishing agents – Knowledge of modern modular assembly & interior architects and model developments – docking of ships in dry dock – knowledge of block setting in docks -(for both new ship building projects & repair).
A3	**Assistant Engineer (Painting)**	• **HSE & IMS-** Awareness on Industrial safety & PPEs – Importance of house keeping – Knowledge of IMS – Quality Standards – 5 S – management of industrial hazardous wastes • Basic knowledge of computer applications • **Organisational Skills-** Role of a supervisor – Manpower management & resource planning – Work force motivation – Grievance handling at shop floor level – Code of Conduct & Discipline - Importance of time keeping & productivity. **Theoretical and application knowledge on**

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		• Surface preparation for painting – methods – tools used – standards of preparation – effect of climate – application of paint, methods – on Ships and other marine vessels • Marine Paints and Systems • Quality control and Inspection / tests for Surface preparation and Painting • Corrosion and Cathodic protection • PSPC regulations • Practical maths – Estimation of paint and areas • Marine coating defects • HSE policy – Marine environment and Paints / surface preparation • Equipment used in blasting and painting • PPE for blasting and painting • Disposal of Hazardous wastes • First aid in painting environment
A4	**Assistant Catering Officer**	• **HSE & IMS-** Awareness on Industrial safety & PPEs – Importance of house keeping – Knowledge of IMS – Quality Standards – 5 S – management of industrial hazardous wastes • Basic knowledge of computer applications • **Organisational Skills-** Role of a supervisor – Manpower management & resource planning – Work force motivation – Grievance handling at shop floor level – Code of Conduct & Discipline - Importance of time keeping & productivity. • Duties and responsibilities of catering supervisor, • Statutory Factory canteen, lay out and other requirements, • Types of catering establishments, welfare catering, transport catering etc, • Different types of utensils and appliances in a canteen • Subsidized canteen services • Personal hygiene - Housekeeping • Food production, food ingredients, recipes, food groups, food additives, food adulteration, food poisoning and intoxication, preparation and mixing of food ingredients, Diet, Balanced Diet, cooking, effect of heat on food, kitchen equipments, workflow in factory canteen kitchen, • Vegetables and its classification, vegetable cookery, egg cookery • Preparation of Tea / coffee / snacks – ingredients and its measurements • Food safety Act and Regulations in India • Knowledge of basic computer applications
A5	**Accountant**	• Basic knowledge of computer applications **Theoretical and application knowledge on** • Financial Accounting • Trading & Profit & Loss Accounts and Balance Sheet • Bank Reconciliation Statement • Depreciation, Reserves and Reserve Funds, Ratio Analysis

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		• Capital and Revenues, Revenue Accounts, Receipts & payments Accounts, Income & Expenditure Accounts • Company Accounts • Financial Statements and Reporting • Cost Accounting, Cost Records and Cost Audit • Direct and Indirect Taxes- Income Tax Act, Central Sales Tax Act, Service Tax Act, Central Excise Act • Contracts Act, Payment of Gratuity Act, Payment of Bonus Act, ESI Act, EPF Act. • Companies Act, Factories Act, ID Act • FEMA, SCRA and SEBI Act. • Company Audit, preparation of Auditors Report and other requirements.
B1	**Technical Assistant** **[Mechanical, Electrical]**	**MECHANICAL** **Theoretical and application knowledge on** • Power Cycles • Engines – Types, Principles & Parts • Boilers & Compressors • Turbines • Pumps – Types, principles • Valves • Propulsion System in ships • Basic Hydraulics • Machining Process • Welding Technology • Metallurgy • Refrigeration systems • Units and Measurements • Bearings and Pulleys • Limit, fit & tolerance • Basic laws and theorems **ELECTRICAL** **Theoretical and application knowledge on** • Circuit theory • Electrical Machines • Electrical Measurement & Measuring Instruments • Switchgear & Protection • Power electronics • Industrial Drives & control • Power transmission and distribution • Microprocessors & its Applications • Hazardous wastes and its management
B2	**Junior Technical Assistant [Mechanical, Electrical, Electronics, Civil]**	Attached as Annexure 1
B3	**Senior Ship Draftsman [Mechanical, Electrical]**	Attached as Annexure 2
B4	**Junior Commercial Assistant**	• Office procedures, office correspondence, • Record keeping and maintenance of files, Act and Regulations, • Use and application of computer in office, Data entry,

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		computer network, computer devices, operating systems, Windows, MS Word, MS Excel, • Computer maintenance, • Office stationery, paperless office, • ERP, • Duties and responsibilities of Commercial Assistants, • E-commerce, • Environment, • Communicative English, • Business Communication, • Accountancy, • Desktop Publishing, • Data storage, • Cyber security
B5	**Stenographer**	• Comprehension – Questions based on articles, synonyms, antonyms, meaning derived, heading, etc • English Grammar - Jumbled sentences, tense, appropriate words, singular & plural, correcting errors etc. • Office Administration - Types of letters, salutation, filing, computer application, communication, • meetings, minutes, • handling office equipments
B6	**Store Keeper**	**<u>Theoretical and application knowledge on</u>** A. <u>Stores /Warehouse Management</u> • Objectives , Functions & responsibilities of Store keeping • Types of Stores • Storage Systems & Layout • Store Management Functions - processes and procedures • Storage of hazardous materials and its management • Category Management- classification and codification • Stock Verification Methods • Material Handling Methods and Equipments • Importance of Documentation B. <u>Inventory Management</u> • Functions of inventory • Classification of inventory • Costs associated with inventory • Inventory control methods (like ABC, FSN, VED analysis etc) C. <u>5S Methodology of housekeeping</u> • Objectives and importance • 5S in practical applications D. <u>Computer Literacy, MS Office & E-mail</u> (2007 & higher versions) • Windows Basics • MS Excel Basics • MS Word Basics • Email – basics and applications

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		E. ERP – Basics • Objectives and importance • Functions • Different ERP Systems like SAP and relevant modules with reference to material procurement F. ISO 9001, 14001 & OHSAS 18001- Objectives and importance G. Customer Relationship Management in stores – Basics, Objectives and importance, Applications
B7	**Instrument Mechanic**	**Theoretical and application knowledge on** • Basic electrical technology • DC and AC circuits • AC & DC machines, theory, speed control • AC & DC instruments, Basic electronics technology including power electronics • Operational amplifiers, Basic digital electronics, Microprocessor • Instrumentation fundamentals & measurement of Motion, Pressure, Flow, Level, Temperature, PH • Process instrumentation & control – Recorders, PID controller • Basic Pneumatic & Hydraulic theory, components & circuits • Basic knowledge on PLC, HART, DCS, SCADA, Computer networking, field bus technology • Basic pneumatics principle • Basic measuring tools & measuring instruments • Basics – electricity (Current, Voltage, Resistance) & electrical components
B8	**Welder Cum Fitter** **Welder, Fitter Structural, Fitter Pipe, Fitter Engineering, Fitter Maintenance**	**Welder** **Theoretical and application knowledge on** • Principle of welding • Welding positions & WPS/PQR/WPQ • Weld joint nomenclature and welding symbols • Welding and cutting tools • Welding techniques • Welding defects and remedial actions • Specification of Welding rods as per AWS • Gouging methods • Welding of Carbon steel/Al/Austenetic SS/High strength low alloys • Pipe welding – Cu, Ni and SS material • Modern welding procedures – SAW/ TIG/ CO2/ Electro gas welding • FCAW process with ceramic backing • One side welding for panel welding • Testing of weld joints • Safety procedures/First aid • Types of material handling equipments

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		Fitter Structural **Theoretical and application knowledge on** • Sheet metal terms like folding/bending/seaming etc • Steel plates and its grades • Welding- types of welding - distortion and remedies • Line heating • Metals and alloys- Characteristics • SM methods/tools/ usage • Types of Sheet Metal joints and specific usage • Methods of laying out pattern/Development • Alignment and fit up of plates/blocks using plates of various thicknesses • Oxy acetylene / plasma cutting • Plate/pipe weld joint configuration • Safety procedures/First aid • Types of material handling equipments **Fitter Pipe** **Theoretical and application knowledge on** • Tools -Marking /Fitting / Fastening • Marking and developing • Method of joining - Welding/Soldering/Brazing • Pipe fittings/joints and their usage • Pipe Classes and Grades • Properties of Steel/Alloys • Numerical ability - Mass/Volume/Density/unit conversion/unit system/ Ratio/ Proportion/ Mensuration • Material estimation for the piping layout • Piping symbols • Template and their preparation • Hydrostatic/hydraulic testing of Piping systems • Erection of piping systems and valves • Pipe fastening methods and bending of pipes • Safety procedures /First aid • Types of material handling equipments **Fitter Engineering** **Theoretical and application knowledge on** • Tools - Bench wise/Files etc • Marking and measuring tools • Limits/Fits/Tolerance • Numerical ability – Mass/Volume/Density/unit conversion/unit system • Shaft alignment • Erection & commissioning of equipments • Valve timing/Tappet clearance • Decarbonising • Fasteners and torque tightening • Engine systems • Engine type and functions • I/C Engines and its parts • Types of bearings and its uses • Safety procedures /First aid • Types of material handling equipments

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		Fitter Maintenance **Theoretical and application knowledge on** • Tools Bench wise/Files etc • Marking and measuring tools • Limit/Fits/Tolerance • Numerical ability – Mass/Volume/density/unit conversion/unit system • Physical properties of metals and specific usage • Methods for removing the broken nuts • Drilling /reaming/horning/Counter sunking • Types of nuts and locking devices • Types of valves and maintenance • Bearings and pulleys • Overhauling of machineries • Types of maintenance • Shaft alignment and shaft sighting • Bedding or Chocking of machinery foundations • Safety procedures /First aid • Types of material handling equipments
B9	**Fitter (Electrical)**	**Theoretical and application knowledge on** **Fundamentals of electricity:** various laws of electricity and its applications, Basic electrostatics & electro dynamics, primary and secondary cells, magnetic and capacitive circuits, power and power factor, polyphase system, measuring instruments, measurement of power and energy. **Electrical appliances and wiring:** • domestic appliances- lighting, various types of lamps, wiring circuits • domestic and industrial, earthing, regulated power supply, maintenance of domestic appliances, IEE rules. **Electrical machines:** D.C generators & DC motors-characteristics and applications, speed control and testing, transformers& autotransformers- losses and testing, alternators, single phase& 3 phase motors, starter and internal connection diagrams. **Basic electronics:** 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. **Winding of machines:** fundamental terms used in windings, winding of transformers, motors, armature winding, material used, and method of connection. **Electrical Switchgear**: principle, operation & application of Fuses, MCCB, Protective relays, ELCB. • safety for handling electrical equipments/ wiring/ applications • statutory requirements while handling electrical applications

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
B10	**Fitter (Electronics)**	**Theoretical and application knowledge on** • Difference between conductor, insulator and semiconductor • RC, LC and RLC circuits. • Symbols , working principle and applications of various electronic components like diode, transistor, zener diode, ,SCR,UJT,FET, Diac, Triac, MOSFET,IGBT. • Half wave and full wave rectifier circuit , Filter circuits and Ripple factor. • Single stage and multi stage amplifier and types of signal. • Boolean Algebra, Logic Gates, Truth tables and Flip Flops • Fundamentals of DC motor, slip ring and squirrel cage induction motor • Speed control of AC/ DC Motors • DOL ,star delta and Soft starters • Concept of DC drives and AC drive(VFD) • PLC and ladder logic basics, Microprocessor controls & I/O Devices • Concept of CCTV and Networking • Power supply, SMPS and UPS • Navigation and Communication Equipments: ➢ GMDSS, Gyro compass, Radar, Echo sounder, GPS and DGPS, Doppler log, AIS, Steering control(Autopilot),various types of Antennas and Band of Frequencies. ➢ PA system, Talk back system, EPABX • Fire alarm system – Conventional and Addressable types • Testing/Measuring Instruments like Oscilloscope, Function generator ,Spectrum analyzer, Tachometer, Tong Tester and Megger • Calibration of measuring instruments like Voltmeter, Ammeter, KW meter ,Power Factor meter, KWH meter, insulation meter • Battery chargers and Batteries, Serviceability checks &Capacity test of batteries. • ICCP controls ,Anodes and Reference Electrodes • Dynamic Positioning systems. • DA/AD converters • Different types of Proximity switches ,Level switches, Pressure switches &transmitters • Photo diodes and photo transistors, RTD's and Thermocouples • Tacho generators and Encoders • Need of modulation and de-modulation, Type of modulation ,Radio transmitter and receiver • Advantages of FM over AM • SSB receivers. • Satellite communication and micro-wave communication • Positive and Negative Regulators using IC's • Oscillators, PLL's and Synthesizers • Op-Amps using IC 741 • Timers using IC555

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		• LCD/LED Displays • TV Receivers and HD systems. • Dish TV systems • Electronics in Welding sets • Various braking systems used in cranes • Speed control of LLTT cranes • Requirement of AVR's in Alternators • Safety measures while handling Electrical and Electronics equipments. • Soldering and De-Soldering Techniques
B11	**Painter**	**Theoretical and application knowledge on** • Types of Surface Preparation and application methods for marine painting. • General awareness of tools & equipment for surface preparation and painting. • Corrosion. • Types of Paints and paint systems • HSE & PPE-Marine paints & Surface preparation. • Coating defects – its rectification
B12	**Shipwright Wood**	**Theoretical and application knowledge on** Wood working terminologies – Wood working machineries (portable & stationary) – its application & routine maintenance. Various hand tools- measuring instruments for wood working and its relative advantages – Wood preservation & seasoning- Timber identification – Defects in timber – Understanding measurements & tolerances – Knowledge of various wood working joints, furniture fabrication appropriate application and their relative merits & demerits – Knowledge of laminate material, hardware items, & its relative merits – Application of adhesives & finishing agents – Knowledge of modern modular assembly & interior architects and model developments & docking including block setting in marine field (Both new building projects & repair). • **Industrial Safety** Awareness on Safety & PPEs - Importance of house keeping
B13	**Machinist**	**Theoretical and application knowledge on** • Measurement tools- Vernier calipers/ dial gauges etc. • Lathe, Drilling & Milling machines • Tools nomenclature • Bench tools • Drawings and standards- Limits / fit / clearances etc. • Types of Materials related to ship Building • Industrial safety
B14	**Crane Operator (Electrical)**	**Theoretical and application knowledge on** • **Basic Electrical Practice** - AC & DC Voltage, AC& DC current, Power Factor, DC Circuits, Resistance, Capacitance and Inductance. • **Measuring Technique** - Measuring of Voltage, Current and Resistance, Panel Meters, Multimeters, Tong Tester,

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		Megger, Measuring of Energy, Errors and Corrections. • **Electrical Appliances** - Domestic Appliances , Lighting, Types of Lamps & lamp fittings • **Wiring Practice** - Types of Wiring, Different Types of Cables and End Termination. • **Electrical Machines** - DC Generator , DC Motors , Speed Control of DC Motors, Testing of DC motors , Transformer Losses, Alternators, Induction Motors and Testing , Speed control of Induction Motors, Starters. • **Basic Electronics** - PN Junction Diodes, Zener Diode, LED & Applications , Cathode Ray Oscilloscope, Rectifiers& Regulators, Transistors & Amplifiers , SCR, UJT, Diac, Triac and Flip Flops. • **Winding Practice** -Winding Of Transformers and Motors. • **Installation & Maintenance of Electrical Equipment** - Battery Charger & Batteries, Circuit Breaker (MCB, MCCB, ELCB, RCCB), Relays, Voltage Stabilizer, Regulated Power Supply, Bus bar System. • **Cranes (EOT, LLTT & Gantry)-** Basic Rigging , Check and maintenance of Crane ropes, Rope pulleys, Load hooks and end fittings , Standard safety practices while operating Tower cranes, Preventive maintenance of LLTT cranes , Various Electrical & Mechanical Braking system in Cranes , Safety devices used in Cranes, Different voltage systems and backup systems, Different types of anchoring, Wind speed measuring & Storm safety devices, Anti-collision devices , Limit switches, Drives and PLC controls, Basics components of computers, Load measuring and indicators, Various communication methods and Hand Signals, Safety codes and standards, Awareness of Industrial Rules and Regulations.
B15	**Crane Operator (Diesel)**	Attached as Annexure 3
B16	**Serang**	**Theoretical and application knowledge on** • General maintenance and preventive maintenance of small crafts • Fitness of small crafts - statutory requirements • Requirements of registration certificates and other statutory documents • Qualifications of boat Crew - Grant Of Certificate Of Competency and Certificate Of Service • Power of the competent authority to suspend or cancel certificates • Steering and Sailing, Lights, Sound Signals and Prevention Of Collision Of Vessels • Conduct of vessels in sight of one another • Conduct of vessels in restricted visibility • Life saving appliances on board of vessels • On board Fire Fighting Equipments • Machinery and equipment, stability, speed limitation, engine capacity and other accessories • Passenger vessels and cargo vessels- comparisons –

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		Operation and Statutory documents
B17	**Fireman**	**Theoretical and application knowledge on** • Basics of Fire, Fire Prevention, Fire Fighting, Salvage • Physics and chemistry of fire • Different types of fires • Indian Standards relating to Fire Fighting Equipments and Appliances • Fire service hydraulics • Plan reading • Passive and Active fire protection systems • Hose and hose fittings • Branches and nozzles • Ladders • Pumps and primers • Portable fire extinguishers construction, performance & maintenance • Foam and foam making branches • Fixed fire fighting installations • Respiratory supporting systems in fire fighting(SCBA, ELSA etc) • MSDS awareness (Hydrocarbons, chemicals) • Storage requirements and classifications for Hazardous goods, Explosives, Petroleum etc • Electricity – Concepts, safety • Different types of extinguishing media. • Practical fireman ship • Automatic Fire detection and alarm systems • First aid, Resuscitation and CPR • Sprinklers and drenchers • Basic knowledge on NBC part-IV requirements. • Important rescue tools and its use • Global warming and environmental protection- green house gases, ozone depletion, new technologies in firefighting. • Clean agent fire fighting system – operation, maintenance & salvage.
B18	**Semi Skilled Rigger**	**Theoretical and application knowledge on** • Rigging Procedures and Practices – Types of loads and its lifting ,Measuring units, sign boards, lifting drawing / symbols , Tag Lines, Lifting Points, Types of lifting slings / ropes , Rope Reeving, knots and splicing. • Different types of hoist mechanisms • General awareness of Cranes - Different types of Cranes, understanding of crane dynamics including swinging, raising, lowering, stopping loads and boom deflection. • Communication- Hand Signals - Communication using Walkie Talkie. • Lifting Criteria - Centre of Gravity, Effect of sling Angles, Personnel lifting, rope dimensions etc. • Rigging Equipment and accessories - Chain blocks, chain

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		lifters, Jacks, Ropes, belts, slings and other lifting tools & Tackles. • Safety Rules and Measures - Safety associated with all Rigging activities, Hazard identification and its elimination, Emergency procedures, fall protection. • Types of material handling equipments
B19	**Staff Car Driver**	• Traffic rules • Traffic Signals • Sign Boards on roads • General Details regarding Vehicles • General maintenance of vehicles • Documents required for driving • Insurance and tax details • First Aid • Etiquette and dignities to be followed by a staff car driver • Road safety
B20	**Lascar (Floating Craft)**	**Theoretical and application knowledge on** • General maintenance and preventive maintenance of vessels • Fitness of vessel- statutory requirements • Requirements of registration certificates and other statutory documents • Qualifications of Vessels Crew - Grant Of Certificate Of Competency and Certificate Of Service • Power of the competent authority to suspend or cancel certificates • Steering and Sailing, Lights, Sound Signals and Prevention Of Collision Of Vessels • Conduct of vessels in sight of one another • Conduct of vessels in restricted visibility • Types of mooring operations – ropes – knots • Flags and navigational signals • Life saving appliances applicable on board of vessels • Vessels Fire Fighting Equipments • Machinery and equipment, stability, speed limitation, engine capacity and other accessories • Passenger vessels and cargo vessels comparisons / Operations and Statutory documents
B21	**Service Assistant (Office)**	• Office Equipments, Filing, Circulars, Gazettes • Types of letters • Road safety • Safety at work place • Office etiquettes & safety of women at work place • Fire and Safety Precautions, PPE • Hygiene and Health
B22	**General Worker (Canteen)**	• Fire and safety precautions and its importance in an industrial canteen • Personal safety, hygiene and health • Preparation &cooking method of different type of food stuffs, curries and snacks

Sl No	Name of Post	Syllabus - Trade / Discipline related (Part B)
		• FSS Act 2006 and its implications related with an industrial canteen • Concept of an industrial canteen under Kerala factories rules 1957 and its functions • Procedure of dish and utensil washing both manual and machine. • Calculation of material quantity for different food stuffs, curries and tea • Duties and responsibilities of a canteen worker. • Different type of food serving systems in industrial canteens - Merits and demerits. (Queue system, Buffet, Self-service, Table service etc.)

6. Please note that the above syllabus is only indicative and not exhaustive.

7. **The written tests will be held on 18 June 2016 and 19 June 2016, during the forenoon and afternoon sessions at various centres in Kochi/ Ernakulam.** The timings of the sessions, venue and other details will be informed in a week's time, to eligible candidates. Call letters will be available for downloading from CSL website.

8. For each post, based on the marks secured in the OMR written test, the candidates will be short-listed according to the cut-off marks and / or in the ratio of 1:7 for attending Phase II.

9. The mark allotment of Phase II is as under:

Post Codes	Descriptive test	Skill/ Proficiency test	Practical Test	Physical Test
A1 to A5, B1,B2,B4,B6	30	-	-	-
B3, B5	-	30	-	-
B7 to B15	-	-	70	-
B16, B18 to B22	-	-	70	-
B17	-	-	-	70

10. Further details of the Descriptive / Skill / Proficiency / Practical / Physical Test, will be communicated to the short-listed candidates separately.

Sd/-

मुख्य महा प्रबंधक (मा.सं.) /CGM (HR)

Syllabus for Junior Technical Assistant (Mechanical)

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	Energy sources Fundamentals of thermodynamics Ideal gasses Steam turbines and condensers 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
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, hysterisis 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
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

Syllabus for Junior Technical Assistant (Electrical)

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
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

Syllabus for Junior Technical Assistant (Electronics)

1	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
2	Solid State Physics	Conductors, Semiconductors and Insulators
3	Active and Passive Devices in circuits, Switching circuits	Resistors, Capacitors, Diodes, Special Diodes, Transistors, FET, Thyristors, DIAC,TRIAC, Optoelectronics Devices, IGBT, switching applications
4	Amplifiers and Oscillators	Single Stage and Multistage Amplifiers, Feedback amplifier, Sinusoidal and non-sinusoidal Oscillators
5	Integrated Circuits and Logic Gates	Basic gates and equivalent circuits, Adders, Subtractors, Op-Amp, Flip Flops
6	Transducers	Hall Effect, Classification/Types and working- LVDT, proximity sensors, piezoelectric transducers, working of Load cell
7	Electronic Instruments	Analog and Digital Instruments, Multimeter, Voltmeter, Ammeter, CRO
8	Power Supplies	Unregulated and Regulated Power Supply, Rectifiers, SMPS, UPS
9	Number Systems, Boolean Algebra	Decimal and Binary number systems- Conversion problems, Laws of Boolean Algebra
10	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 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 Cycloconverters.
11	Principles of Communication	Modulation and De-modulation types, FSK, PSK, TDMA, FDMA, CDMA. Electromagnetic Spectra, Basic principles of Fibre Optic communication
12	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
13	Ship Communication Equipments	GMDSS, marine VHF, RADAR, INMARSAT Equipment, Antennas in ship
14	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
15	Energy Conservation	Renewable sources of energy, VFD for industrial use
16	Basic Computer Applications	Hardware and software, Operating systems and applications, Internet

Syllabus for Junior Technical Assistant (Civil)

1	Surveying	Chain surveying – principles, instruments, ranging, and chaining survey lines, field work and field book, selection of survey stations, units of land area.
2	Levelling	Levelling instruments, different types, bench mark, reduced level of points, booking of field notes, reduction of levels by height of collimation method. Modern survey – instruments – Total station, Electronics theodolite.
3	Materials	Brick – varieties and strength, characteristics of good brick. Cement –varieties and grade of cement and its uses. Steel – types of steel for reinforcement bars, steel structural sections. Aggregates – types & requirements of good aggregates. Concrete – grades of concrete as per IS code, water cement ratio, Workability, mixing, batching, compaction and curing.
4	Masonry	Classification-Stone masonry-Brick masonry-Laterite masonry–composite masonry. Different types of stone masonry-General principles and specifications for stone masonry.
5	Brick masonry	Different types of bonds for walls, piers and junctions of walls for equal and unequal thickness-English, Flemish (Single and Double Flemish)-Specification for brick masonry as per relevant codes. Hollow block masonry, Solid block masonry and inter locking block masonry. Types and methods of construction-Advantages and Disadvantages with reference to other types of masonry.
6	Damp proof courses	Definition of dampness–causes and effects–methods of prevention–surface treatment–internal/external water proofing courses.
7	Form work	Functions-materials used– Requirements of good form work–Scaffolding, Shoring Definition–purpose and function–Requirements-materials used
8	Plastering and Pointing	Materials and proportion–Functions–general specifications–types Different components of building from foundation to roof and their functions
9	Foundations	Functions, Classification, Shallow- Deep, Types-Spread footing-raft-mat-column footing-pile foundation-well foundation, bearing capacity.
10	Flooring	Requirements of a good floor, materials used for flooring, Floor finishes–Types Mosaic, Marble, Granite, Ceramic tiles, Vitrified tiles, Glass, Wooden, and other types of modern floor finishes
11	Simple stresses and strains	Types of stresses–Elasticity–Hook's law–Young's modulus–Elasticity, stiffness, plasticity, toughness, brittleness, ductility, Malleability and hardness–Linear strain and lateral strain–Poisson's ratio-volumetric strain—Bulk modulus–modulus of rigidity

12	Beams and bending	Classification of beams–cantilever, simply supported, fixed, overhanging and continuous. Types of loading– concentrated, uniformly distributed and uniformly varying load. Shear force and bending moment–definition and sign conventions. Calculation of SF and BM for Cantilever, simply supported and overhanging beams and sketching of SF and BM diagrams (for point load, uniformly distributed load, uniformly varying load and combinations of u.d.l and point loads) Relation between SF and BM.
13	Carpentry	Carpentry material-timber-structure, classification-soft wood, hard wood-carpentry tools marking and measuring tools, cutting tools, boring tools, striking tools, holding tools Carpentry processes-marking, sawing, planing and chiseling
14	Tender and Tender notices	Necessity of tenders – sealed tenders – tender notice, tender document – Earnest money and security deposit – opening of tenders – scrutiny of tenders – comparative statements – selection of contractors – negotiation, acceptance of tender, work order – contract agreement – conditions of contract. Type and characteristics of Contracts and Tenders.
15	Measurement of Works	Measurement book – Rules to be followed in recording measurements – pre-measurements and check measurements – contractor's acceptance of measurement.
16	Payment of Bills	Types of bills – first and final bills – preparation of bills –running account bills – modes of payment – checking of bills –recoveries to be made from bill – mobilization advance- secured advance- liquidated damages - penalty
17	Construction Machinery	Earth moving equipments , Concrete Machinery , concrete mixers , ready mix plants, compaction machinery, vibrators ,Lifting and hoisting machineries ,pumps ,general civil engineering tools
18	Principles of Safety in Construction	Causes, effects and prevention of accidents, safety practices in construction – Site Engineers / Supervisor's role – safety through legislation – precautions during handling of materials occupational hazards and basic guidelines for safety in construction industry.
19	Estimation	Data Required for Preparation of an estimate, Type of Estimate, Detailed and abstract estimate, Analysis Of Rates , Detailed estimate preparation for a single/two storied building (residential and office) with Septic Tank , soak pit , RCC roof and steel roof truss. Detailed estimate of RCC beam, slab, column etc and preparation of bar bending schedule. Detailed specifications for various items of work of Earth work excavation, Foundation concrete, Masonry work, DPC, Form work, RCC, Plastering, Pointing, Flooring, Painting and Polishing.

20	Docks and Harbours	Wharves, Jetty, Dolphins, fenders, docks, Uses of wet docks and Dry docks, break waters , aids to navigation, dredging methods, Major Ports in India, Major shipyards in India.
21	General	Kerala building rules, computer software's in civil engineering, units, conversions, Statutory requirements for Coastal zone constructions , Pollution Control Board
22	Basic Computer Applications	Hardware and software, Operating systems and applications, Internet

Syllabus for 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.

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
- 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

Syllabus for 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

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

Syllabus for Crane Operator Diesel

- Safety & Precautions to be observed in the shop. Basic first aid, safety signsPeriodic testing of lifting equipment,
- Hand & Power Tools:-
- Fasteners- Study of different types of screws, nuts, studs & bolts, lockingdevices, Such as lock nuts, cotter, split pins, keys, circlips, lock rings, lockwashers and locating where they are used. Washers & chemical compounds canbe used to help secure these fasteners. Function of Gaskets, Selection ofmaterials for gaskets and packing, oil seals. Cutting tools :- Study of differenttype of cutting tools like Hacksaw, File- Definition, parts of a file, specification,Grade, shape, different type of cut and uses., OFF-hand grinding with sander,bench and pedestal grinders, safety precautions while grinding. Limits, Fits &Tolerances:-Definition of limits, fits & tolerances with examples used in autocomponents
- Description of Chemical effects, Batteries & cells, Lead acid batteries & StayMaintenance Free (SMF) batteries and Charging Dynamo.
- Pneumatic Symbols, Description and function of air Reciprocating Compressor.Function of Air service unit (FRL-Filter, Regulator & Lubricator).
- IC Engines Description of internal & external combustion engines, Enginespecification. various gauges/instrument on a dash board of a vehicle-Speedometer, Tachometer ,Fuel gauge and Indicators. Different type of startingand stopping method of Diesel Engine
- Diesel Engine Components: cylinder- cylinder head – piston – crankshaft-fuelfilters and valves – operational procedures
- Various systems in an engine -Cooling systems- intake & exhaust system – fuelsystems
- Emission Control:- Sources of emission, Types of emissions, Controlling air fuelratios.
- Description of starter motor circuit.
- Troubleshooting : Causes and remedy for Engine Not starting – Mechanical &Electrical causes, High fuel consumption, Engine overheating, Low PowerGeneration, Excessive oil consumption, Low/High Engine Oil Pressure, EngineNoise.
- Various types of Cranes (Mobile, Telescopic, Tower crane, Truck mounted)
    - Basic Rigging , Check and maintenance of Crane ropes, Rope pulleys , Load hooks and end fittings , Standard safety practices while operating cranes , Preventive maintenance of cranes , Various Electrical & Mechanical Brakingsystem in Cranes , Safety devices used in Cranes , Load measuring and indicators , Various communication methods and Hand Signals , Safety codes and standards , Awareness of Industrial Rules and Regulations.