

GROUP-19

Boiler Attendant (Level of Exam- Matric+ Class-II Certificate by C.I.B.)

1) General awareness, Reasoning, Mathematics, Science, History including Haryana related history, current affairs, literature, Geography, Civics, Environment, Culture etc. - **(Weightage 20%)**

2) Computer terminology, Fundamentals, word software, excel software, Power point, internet, web browsing, Communication, emails, downloading and uploading data on websites etc. -

(Weightage 10%)

3) Subject related syllabus-

(Weightage 70%)

Engineering Drawing

Engineering Drawing: Introduction and its importance Drawing Instruments: their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips, Lines :- Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line, Drawing of Geometrical Figures: Definition, nomenclature and practice of - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram, polygons. - Circle and its elements, Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case, drawing sketches of different types of valves, such as gate valve, globe valve, ball valve, Plug Valve, check valve etc., Drawing of different types locking devices such as double nut, castle nut, pin etc., Symbolic representation of different types of valves- gate valve, globe valve, butterfly valve, ball valve, diaphragm valve, control valve, non-return valve, and needle valve,

Workshop Science & Calculation

Unit: Systems of unit- CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units, Fractions: Fractions, Decimal fraction, L.C.M., H.C.F. Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator, Ratio & Proportion: Simple calculation on related problems, Percentage: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa, Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi-circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere, Material Science : Properties - Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and non-Ferrous metals, Mass ,Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals, Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy, Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation, Archimedes' principle, principle of floatation hydrometers. Centre of gravity and Equilibrium condition, Pressure, temperature, Boyle's law, Charles's law, Equation of perfect gas. Calculations, Centre of Gravity, (C.G. Of square, rectangle, triangle, circle, semicircle, cone) & its calculations,Flow of fluids-Equation of continuity, Bernoulli's theorem,Flow measurement by orifice meter, venturi meter, Rota meter, U-tube manometer, Definition - viscosity, flash point, fire point, flash points of standard lubricating oils, octane number,Latent heat, sensible heat, saturated steam, wet steam, superheated steam. Reynolds's number, at different velocities.

Professional Knowledge

Part-1

Introduction of Trade and Importance of Safety and General Precautions observed in the workshop. Introduction of Steel Rule, Callipers types and uses,Introduction of functions and types. Try square and

functions & uses of scribing Block / Marking Block. Introduction of Files, Types of Filing – Details, Introduction of Hacksaw, types functions and Blade, specifications types & uses etc. types of Files, Special files, functions, uses, Introduction of Chisels, types, Chipping & types of Hammers uses & functions. Safety Precautions, Introduction of Drill bits in detail and types, functions and Types of Drilling Machines. Introduction of Taps & types and other related details – Tap drill size calculation, Introduction of precision instruments, vernier calliper, Micrometres, Vernier height gauge & other related instruments, Introduction of Dyes, Types & Function, Safety Precautions during Dye operation. Introduction about combination set & its uses, Introduction about nomenclature of screw threads – types. Introduction about Nuts & Bolts – types of spanners & studs, Introduction about fasteners – keys – keyways – types – functions & other related details, Introduction of sheet metal – cutting snips – different sheet metal tools – stakes & types – Hand shearing matching & its function – types of sheet metal joints, Rivets – types & their uses, method of riveting – specification of rivet – safety precaution while riveting, Removing of broken tapes by various methods (stud extractors, Tap extractors) Safety precaution during blind hole tapping & drilling, Introduction of gauges – types – uses & functions (ring gauges, snap gauges, plug gauge etc.).

Part-2

Safety at work causes and types of fire. fire extinguishers type and uses General Safety precautions in Boiler house, different equipment and Instruments used for boiler. Electricity- electric safety Ohm's law, series & parallel connections, what is IBR and non-IBR Boilers?

PRESSURE: Definition of pressure. Types of pressure & their units. Types of pressure sensing elements- bourdon tube, diaphragms, capsules, and bellows. Pressure switches types and applications. Types of manometers. Dead weight tester and comparators and applications. Importance of ID fan & FD fan in Boiler.

Temperature measurement: Definition, Units of Temperature, modes of heat transfer, Temperature gauges – bimetallic, liquid filled system thermometer working and application. Temperature sensors, RTD, Thermocouple, Optical and radiation pyrometer working and application.

Basic properties of fluids, fluids in motion, getting fluids to flow, units of flow rate and quantity flow, factors affecting flow rate. Relation between flow rate and pressure, area, quantity. Head type flow meter types. Working and application of venturi and orifice flow meter. Rota meter working, application.

Gases - CO, CO₂, O₂., Cooling tower. Working, Application of I to P, and valve positioner, ON-OFF controller, P, PI, PD, PID control limitations and application.

Blower construction and operation.

Steam: Its heating and power properties: Principles of steam and application in Modern Boilers. Steam preventing, escape of heat, lagging, steam distribution, charging of steam and water line, steam quality, condensate handling, traps etc. Wet steam saturated steam, super-heated steam and their properties. Boiling point, temperature and pressure relations, sensible heat, latent heat super heat, reheat and total heat. Use of steam table and entropy chart. boiling and condensation.

Construction, working and uses of various types of valves.

Construction, working and uses of various types of Pumps Introduction /overview of thermodynamics Construction, working and uses of various types of heat exchangers, condenser & cooler.

Water treatment: Object of feed water treatment – water analysis water of high-Pressure boilers. Impurities in water and their harmful effects. Effects of other suspended matter such as Oil, alkalinity, hardness, etc. in feed water- Total dissolved solids – Methods of purification – use of Deaerators – Priming and foaming – scale formation and corrosion. Chemical cleaning of boiler, softening and demineraliser Plant.

Types of boilers-fire tube and water tube boilers Forced circulation boilers. Preheater, Economizer, waste heat boiler. Boiler drum. Boiler mounting and fittings. Boiler accessories. What is IBR and non-IBR Boiler? Knowledge of Indian Boilers Acts and Rules.

Occupational Safety, Health & Environment Education

1 Safety & Health Introduction to Occupational Safety and Health importance of safety and health at workplace. 2 Occupational Hazards Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical

Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention. 3 Accident & safety Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures. 4 First Aid Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person 5 Basic Provisions Idea of basic provision of safety, health, welfare under legislation of India. 6 Ecosystem Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance. 7 Pollution and pollutants including liquid, gaseous, solid and hazardous waste. 8 Energy Conservation of Energy, re-use and recycle. 9 Global warming Global warming, climate change and Ozone layer depletion. 10 Ground Water Hydrological cycle, ground and surface water, Conservation and Harvesting of water 11 Environment Right attitude towards environment, Maintenance of in-house environment.

Labour Welfare Legislation

Welfare Acts Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.

Quality Tools

1 Quality Consciousness: Meaning of quality, Quality Characteristic 2 Quality Circles: Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles. 3 Quality Management System: Idea of ISO 9000 and BIS systems and its importance in maintaining qualities. 4 House Keeping: Purpose of Housekeeping, Practice of good Housekeeping. 5 Quality Tools Basic quality tools.

Important Note: The Weightage as mentioned against the syllabus is tentative & may vary.