

**SYLLABUS FOR THE POST OF FIREMAN (Kerala Kerakarshaka  
Sahakarana Federation Limited (KERAFED))  
(Total Marks – 100)**

**Unit I Safety and Hand Tools** -Importance of Safety and General Precautions observed in the workshop Accident prevention, Personal Protective Equipment, First Aid Method, Hazard identification and avoidance, Safety signs for Danger,Warning, caution & personal safety message, fire extinguishers types and uses General Safety precautions in Boiler house, different equipment and Instruments used for boiler. Hand tools, Simple measuring instruments, Cutting tools and its Operations  
(Marks 10)

**Unit II Units and Measurements** - Systems of units, Units of length, area and volume, Mass weight and Density, Work Power Energy, Heat and Temperature ,Pressure, absolute pressure, atmospheric pressure, gauge pressure, Pyrometers, Volume, Quantity of heat, Mechanical equivalent of heat , Boyle's law, Charles's law, Pascal's Law. Precision measuring instruments and Gauges  
(Marks 10)

**Unit III Fasteners** - Nomenclature of screw threads – types. Introduction about Nuts & Bolts – types of spanners & studs. – keys – keyways – types – functions & other related details. Sheet Metal - cutting snips– different sheet metal tools – stakes & types – Hand shearing machining & its function – types of sheet metal joints. Rivets – types & their uses, method of riveting – specification of rivet – safety precaution while riveting Pipe and Pipe line fitting etc  
(Marks 10)

**Unit IV Types of Steam & Types of air Draughts** - Wet steam - Dry steam - Super-heated steam – Negative Air draught - Balanced Air draught – Positive Air draught. Formation of steam, Effect of pressure on the boiling point of water, Conditions of steam Methods of determination of dryness fraction of steam, Degree of superheat, Specific volume of water, wet steam, dry steam, superheated steam, Concept of Enthalpy, Temperature- Enthalpy diagram.  
(Marks 10)

**Unit V Boiler – Types, Functions and Classification** - -Functions of a Boiler, Classification of boilers, Terminology of boilers , Lancashire and Cornish boilers, Multi-tubular fire tube boilers: Horizontal and vertical boilers, single pass and multi pass boilers, Locomotive boilers, Vertical cross tube boilers, Cochran Boilers, Scotch Marine fire-tube boiler, Water tube boilers, Babcock and Wilcox boilers, Stirling boilers, Integral furnace boilers, external furnace boilers, waste heat recovery boilers, small industrial boilers .

(Marks 10)

**Unit VI Boiler Mountings, Accessories and Maintenance** - Boiler mountings and accessories, Safety valve, Water level indicators, Pressure gauge, attachment for inspector's test gauge, Steam stop valve, Feed check valve, Blow off cock, manhole, mud hole, fusible plug, economizers, Air pre-heaters, Super heaters, Feed pumps, Injectors, automatic water level controller.  
(Marks 10)

**Unit VII Draught System** - Definition of draught, Classification of draught, Functions of a chimney, Natural draught, Determination of a height of a chimney to produce a given total static draught, condition for maximum discharge through a chimney, Efficiency of a chimney , Draught losses, Artificial draught, Advantages of mechanical draught, Induced draught, Forced and balanced draught , Power required to drive a fan , Steam jet draught. Wet steam - Dry steam - Super-heated steam – Negative Air draught - Balanced Air draught – Positive Air draught.

(Marks 10)

**Unit VIII –Fuels and Performance of Boiler** - Classification of fuels, [10 marks] solid fuels, Liquid fuels, gaseous fuels, Hydrocarbons, Calorific value of solid, liquid and gaseous fuels, Experimental determination of calorific value of a fuel, Bomb colorimeter. Evaporation, Boiler performance, Equivalent evaporation, steam generation, boiler efficiency, Boiler trial, Boiler house instruments, Boiler house records, heat losses in boilers

(Marks 10)

**Unit IX - Combustion of Fuels and Boiler Water Treatments** - Combustion of a fuel, modes of heat transfer, laws of Thermodynamics. Determination of air leakage in boiler flues, Calculation of heat losses, Flue gas analysis. Scaling, corrosion and erosion in boilers, Boiler feed water parameters, Impurities in feed water, temporary and permanent hardness, Feed water treatment systems, Mechanical Treatment, Chemical Treatment, Heat Treatments

(Marks 10)

**Unit X - Boiler Operating Procedure & Inspection, Rules and regulations Regarding Boilers** - Start-up procedure - Shut down procedure - Monitoring parameters during operation - Period of inspection - Inspection preparedness - Hydro test procedure - Open test procedure. Tube puncture - Safety and blow down valve leakages - Fusible plug blown - Low water level - Excess drum pressure - High flue gas temperature - Back firing - Water carryover in steam. An overview of the Boilers Act, 1923, the Indian Boiler Regulations, 1950, Inspection, testing and certification of boilers. (Marks 10)

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