DETAILAED SYLLABUS FOR THE POST OF BOILER ATTENDANT IN PHARMACEUTICAL CORPORATION (IM)

(CAT.NO.: 370/2025)

(Total Marks – 100)

MODULE I UNITS OF MEASUREMENT [10 marks]

Systems of units, Units of length, area and volume, Units of mass, Units of force, Units of work and power, Units of energy, Important measurements – Pressure, Temperature, absolute pressure, atmospheric pressure, gauge pressure, Pyrometers, Volume, Quantity of heat, Mechanical equivalent of heat.

MODULE II: PROPERTIES OF STEAM [10 marks]

Formation of steam, Effect of pressure on the boiling point of water, Conditions of steam, Saturated steam, Dry saturated steam and wet steam, Superheated steam, Supersaturated steam , Properties of steam, Dryness fraction 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.

MODULE III: STEAM BOILERS – TYPES, FUNCTIONS AND CLASSIFICATION

[12 marks]

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, packaged boilers, dry back and wetback boilers, low pressure, medium pressure and high pressure boilers.

MODULE IV: BOILER MOUNTINGS AND ACCESSORIES [13 marks]

Steam 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, economisers, Air pre-heaters, Super heaters, Feed pumps, Injectors, automatic water level controller.

MODULE V: DRAUGHT SYSTEM [10 marks]

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.

MODULE VI: PERFORMANCE OF BOILERS [8 marks]

Evaporation, Boiler performance, Equivalent evaporation, steam generation, boiler efficiency, Boiler trial, Boiler house instruments, Boiler house records, heat losses in boilers.

MODULE VII: FUELS [10 marks]

Classification of fuels, 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.

MODULE VIII: COMBUSTION OF FUELS [10 marks]

Combustion of a fuel, modes of heat transfer, laws of Thermodynamics, Minimum quantity of air required for complete combustion of 1kg of solid or liquid fuel, Excess air, Gas analysis by mass and by volume, Determination of air supplied from volumetric analysis of flue gases, Determination of air leakage in boiler flues, Calculation of heat losses, Flue gas analysis

MODULE IX: BOILER WATER TREATMENTS [12 marks]

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

MODULE X: RULES AND REGULATIONS REGARDING BOILERS [5 marks]

An overview of the Boilers Act, 1923, the Indian Boiler Regulations, 1950, Inspection, testing and certification of boilers.

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NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.