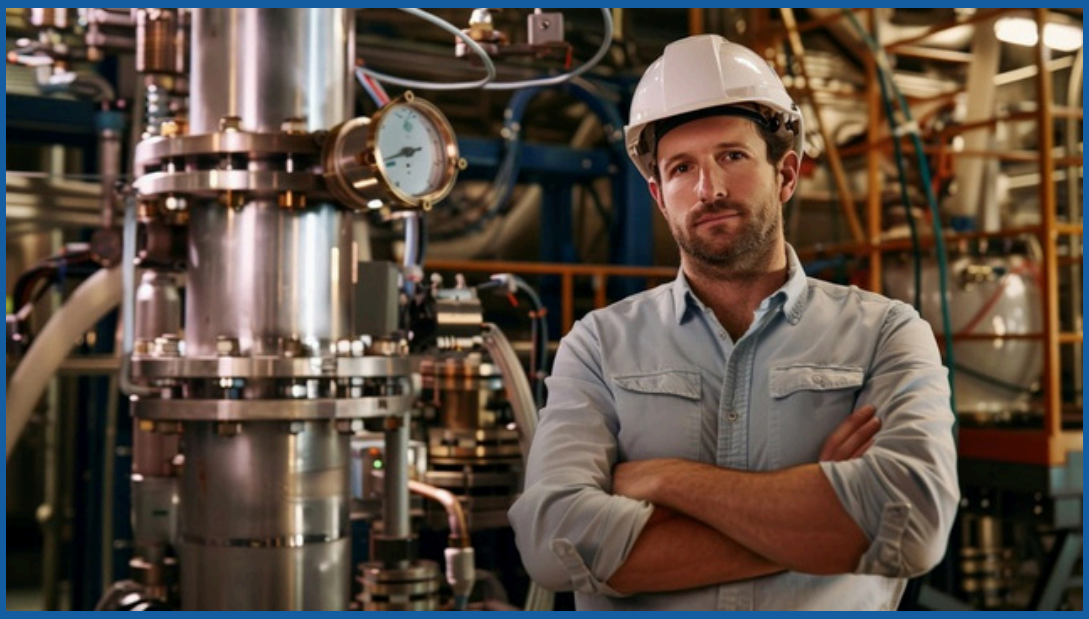
Study Material For Boiler Operation Engineer (BOE) Exams



Theory, Numerical Problems, MCQs and Boiler Drawing Problems from BOE Exams

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GOVERNMENT OF TAMILNADU
BOILER OPERATION ENGINEERS EXAMINATION – 2015
SUBJECT: BOILERS – PAPER I

Time: 3 Hours **Maximum Marks: 100**

Answer ANY FIVE questions.
All questions carry equal marks.

1.(a) Define hoop stress and derive an expression for hoop stress in terms of diameter (d) and thickness (t) of thin shell subjected to internal pressure (p). (10 Marks)

(b) A shell of 2 m diameter and 20 mm thickness is subjected to an internal pressure of 20 kg/sq.cm. Calculate the circumferential stress and longitudinal stress induced in the shell. (10 Marks)

2.(a) A continuous blow down tank is constructed by welding a hemispherical dished end at each end of a cylindrical shell of one metre inner diameter and two metre length. If a pump of capacity twenty litre per minute is used for the hydraulic test of the tank, find the time taken by the pump to fill up the tank. (10 Marks)

(b) It is proposed to paint the outer surface of spare economiser coils stocked in the store of a utility plant. Each coil is made of tube of size 51 mm outside diameter & 5 mm thickness and 18 metre in length. If two litres of paint are required to paint one square metre area of the coil, estimate the cost of paint required to paint 50 coils in stock. Assume that the paint costs Rs.50 per litre. (10 Marks)

3.(a) Explain the terms equivalent evaporation and factor of evaporation for a boiler. (5 Marks)

(b) What is the purpose of super heater? What are the advantages of superheated steam? (5 Marks)

(c) A sample of coal has the following composition by weight. Carbon 75%, Hydrogen 8%, Nitrogen 3%, Oxygen 7%, Sulphur 2% and Ash 5%. Determine its higher calorific value and lower calorific value. (10 Marks)

4.(a) Explain the classification of boilers. (10 Marks)

(b) What is draft? Explain the balanced draft system with a schematic sketch representing pressure variations in the air and gas circuits. (10 Marks)

5. (a) Explain the various heat additions that take place in steam boilers with the help of T-S diagram. (10 Marks)

(b) Define thermal efficiency of boiler. Discuss various heat losses in a boiler. (10 Marks)

6.Write short notes on ANY FIVE of the following: (5x4 = 20 Marks)

(a) Fluidized bed combustion (b) Section Modulus (c) Boiler Auxiliaries
(d) Supercritical boilers (e) Boiler mountings (f) Air preheater

GOVERNMENT OF TAMILNADU
BOILER OPERATION ENGINEERS EXAMINATION – 2015
SUBJECT: BOILERS – PAPER II

Time: 3 Hours **Maximum Marks: 100**

Answer ANY FIVE questions.
All questions carry equal marks.

1.(a) Explain the working principle of Electrostatic Precipitator. Discuss its superior features over other dust collectors. (10 Marks)

(b) Explain the methods used to control SO_x and NO_x in the flue gas. (10 Marks)

2.(a) What is internal boiler water treatment? Explain phosphate treatment. (10 Marks)

(b) Describe the types of boiler tube failures. (10 Marks)

3.(a) Explain the step by step procedure of starting a pulverized fuel fired (or) fluidized bed combustion (or) stoker fired boiler from cold condition. (10 Marks)

(b) Describe the different types of pulverizers used for the preparation of various types of coal. (10 Marks)

4.(a) Discuss the major grades of boiler quality steel material used in the fabrication of various boiler components and piping with limitations. (10 Marks)

(b) Explain the Non-Destructive Testing methods commonly employed for detecting defects in boiler components with their merits and demerits.(10 Marks)

5. (a) Explain the role of different types of instruments with principle used in a boiler to monitor various parameters of operation. (10 Marks)

(b) Determine the height of chimney to produce a static draught of 20mm of H_2O. The mean flue gas temperature in the chimney is 270°C and the atmospheric air temperature is 20°C. Barometer reads 760mm of Hg. The characteristic gas constant R=29.27 kgm/kg K for air and 26 kgm/kg K for Chimney gas. (10 Marks)

6.Write short notes on ANY FIVE of the following: (5x4 = 20 Marks)

(a) Boiler blow down
(b) Heat treatment
(c) Boiler preservation
(d) Deaerator
(e) Economisers
(f) Reverse Osmosis

GOVERNMENT OF TAMILNADU
BOILER OPERATION ENGINEERS EXAMINATION – 2015
SUBJECT: DRAWING – PAPER-III

Time: 3 Hours **Maximum Marks: 100**

Answer ALL questions.
All sketches are to be drawn neatly using pencil.

1.Draw a neat pressure part assembly sketch of a BI-DRUM BOILER with Supereater and Economiser. Name the parts clearly in the sketch. (20 Marks)

2.Draw a neat SCHEMATIC sketch of FEED WATER CIRCUIT of High pressure boiler with drawing symbols. Mark the important parts clearly in the sketch. (20 Marks)

3.Draw a neat sketch of longitudinal sectional view of a 4-stage centrifugal BOILER FEED WATER PUMP and mark its important parts clearly. (25 Marks)

4.Draw a neat sketch of longitudinal sectional view of a direct spring loaded SAFETY VALVE and mark its important parts clearly. (20 Marks)

5. Draw a neat sketch of a WATER LEVEL GAUGE assembly and mark its important parts clearly. (15 Marks)