

22311

12425

03 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answer with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) Define Permanent and Temporary hardness.
 - b) Define Ethalpy of water.
 - c) Define wet steam and superheated steam.
 - d) Write down uses of Air (Any four).
 - e) Define dry bulb temperature and wet bulb temperature.
 - f) Define coefficient of performance refrigeration.
 - g) Enlist water softening methods. (Any four)

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Explain cold lime-soda batch process with diagram.
 - b) Sketch and explain the working of cyclone separator.
 - c) Explain the 'Duties of Inspector as per Indian boiler. Act 1923.'
 - d) Write down selection criteria of refrigerants. (Any four)
- 3. Attempt any THREE of the following:** **12**
- a) Write the properties of Industrial water. (Any four)
 - b) Distinguish between single stage and multistage air compressor. (Any four points)
 - c) Define: (Any two)
 - i) Sensible heating
 - ii) Sensible cooling
 - iii) Humidification
 - iv) Dehumidification.
 - d) Draw neat labelled diagram of fluidized bed boiler.
- 4. Attempt any THREE of the following:** **12**
- a) Write down uses of air dust collectors and electrostatic precipitator. (Any two uses of each)
 - b) Define thermic fluids and write down properties of thermic fluids. (Any four)
 - c) Describe Indian Boiler Act w.r.to.:
 - i) Boiler Registration
 - ii) Certificate of Renewal.
 - d) Describe vapour compression refrigeration cycle with neat labelled diagram.
 - e) Describe construction and working of cooling tower. (Any one)

5. Attempt any TWO of the following:**12**

- a) Determine the amount of heat required to generate 5 kg of steam at a pressure of 10 bar and temperature of 250°C from the water at 25°C. Take specific heat for superheated steam as 2.1 kJ/kg K.
- b) A refrigerator is working on reversed carnot cycle between the temperature of 30°C to -10°C with capacity of 10 tonnes. Find:
- C.O.P.
 - Heat rejected 1 hr. from the system
 - Power required for the machine.
- c) Calculate the temporary and total hardness of a water sample counting.

$$\text{Mg}(\text{HCO}_3)_2 = 73 \text{ mg 1 lit}$$

$$\text{Ca}(\text{HCO}_3)_2 = 162 \text{ mg/lit}$$

$$\text{MgCl}_2 = 95 \text{ mg/lit}$$

$$\text{CaSO}_4 = 136 \text{ mg/lit}$$

6. Attempt any TWO of the following:**12**

- a) Draw neat labelled diagram of Babcock and Wilcox boiler and write its working pressure and steaming capacity.
- b) 200 m³ of air per minute at 15°C DBT and 75% relative humidity is heated until it's temperature is 25°C. Find:
- Relative humidity of heated air
 - Wet bulb temperature of heated air.
- c) Describe Zeolite process for the softening of boiler feed water and write down chemical reaction for Zeolite process.
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