

# 17425

**15162**

**3 Hours / 100 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 answers with neat sketches wherever necessary.  
(4) Figures to the right indicate full marks.  
(5) Assume suitable data, if necessary.  
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. a) Attempt any SIX of the following:**

**12**

- (i) Define:  
1) Ton of refrigeration  
2) Coefficient of performance
- (ii) Name the refrigerants used for refrigeration.
- (iii) What is mean by hard water and soft water.
- (iv) What is the use of steam trap?
- (v) Explain importance of insulation in refrigeration.
- (vi) Compare water tube boiler and fire tube boiler (atleast two points)
- (vii) How temporary hardness is removed? Give chemical reaction.

P.T.O.

- b) **Attempt any TWO of the following:** **8**
- (i) How instrument air is obtained?
  - (ii) Draw and explain psychrometric chart for humidity measurement.
  - (iii) Describe the procedure for inspection of boiler.
- 2. Attempt any FOUR of the following:** **16**
- a) Explain reverse osmosis for water softening.
  - b) Enlist the methods for removal of scale from boiler. Describe any one.
  - c) Define dry bulb temperature and wet bulb temperature. At what conditions both temperatures are equal?
  - d) Identify the effect of hard water used for domestic purpose.
  - e) Describe industrial application of refrigeration.
  - f) Distinguish between process air, instrument air and compressed air.
- 3. Attempt any FOUR of the following:** **16**
- a) Describe vapour compression refrigeration cycle.
  - b) Classify IBR and Non IBR boiler.
  - c) Draw neat sketch of cooling tower.
  - d) Compare humidification and dehumidifications.
  - e) Write any eight application of air in industry.
  - f) Name the boiler mountings and accessories (any two each).

- 4. Attempt any FOUR of the following:** **16**
- a) Describe ion exchange method.
  - b) Draw the neat labelled diagram of Babcock Wilcox boiler.
  - c) Describe properties of an ideal refrigerants.
  - d) Describe spray ponds with neat sketch.
  - e) Why thermic fluid is used instead of steam in industrial heating operations.
  - f) A refrigerator is working on reversed carnot cycle between the temperature of  $30^{\circ}\text{C}$  to  $-10^{\circ}\text{C}$  with capacity of 10 tons.  
Find:
    - (i) C.O.P.
    - (ii) Power required for the machine.
- 5. Attempt any FOUR of the following:** **16**
- a) Classify boiler according to various factors.
  - b) Explain the duties of boiler inspector.
  - c) Explain construction and working of water level indicator.
  - d) Explain following point w.r.to problem in boiler feed water:
    - (i) scale and sludge formation
    - (ii) primming and foaming
  - e) Find the enthalpy, entropy and internal energy of 1 kg of steam at a pressure of 10 bar when steam is dry and saturated.
  - f) Describe any four effect of impure boiler feed water.
- 6. Attempt any TWO of the following:** **16**
- a) Compare conventional methods with advance method (membrane) for water softening on following points:
    - (i) cost
    - (ii) regeneration
  - b) Explain the selection criterion for refrigerants.
  - c) State importance of steam trap. Draw neat sketch of it.
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