313339

24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(7) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Solve any FIVE : **5 × 2 = 10**

(a) Write any four uses of industrial water.

(b) List any four refrigerants in Halocarbon compound group.

(c) Define enthalpy of water.

(d) Write any two objectives of plant maintenance.

(e) Define hardness of water.

(f) Write any two uses of steam.

(g) Define dry bulb temperature.

2. Solve any THREE : **3 × 4 = 12**

(a) List any four limitations of zeolite process.

(b) State any two advantages and disadvantages of locomotive boilers.

(c) Explain carnot refrigeration cycle.

(d) Explain the construction of psychrometric chart.

3. Solve any THREE : **3 × 4 = 12**

(a) State the difference between ion exchange and zeolite process. (any 4 points)

(b) In ammonia absorption refrigerator plant, heat is supplied to generator by condensing steam at 0.3 MPa and 95% quality. The temperature to be maintained in the refrigerator is – 5 °C with atmospheric temperature equal to 30 °C; estimate (i) C.O.P. (ii) Steam flow for 10 tonnes of refrigeration plant when actual C.O.P. = 50% of maximum C.O.P.

(c) A refrigerator is working on reversed carnot cycle between the temperature of 30 °C to – 10 °C with capacity of 10 tonnes. Find

(i) C.O.P.

(ii) Heat rejected per hour from the system

(iii) Power required for machine

(d) Describe the construction and working of natural draft deck type tower.

4. Solve any THREE : **3 × 4 = 12**

(a) Explain the process of formation of steam at constant pressure.

(b) Write a short note on ammonia as refrigerant.

(c) Draw a block flow diagram of vapour absorption refrigeration plant.

(d) List the duties, functions and responsibilities of plant maintenance engineering department.

(e) State the advantages of preventive maintenance and predictive maintenance.

5. Solve any TWO : **2 × 6 = 12**

(a) A water sample was found to contain following salts :

$Ca(HCO_3)_2$ = 40.5 mg/lit

$MgCl_2$ = 23.75 mg/lit

CO_2 = 3 mg/lit

$MgCO_3$ = 21 mg/lit

$CaCl_2$ = 55.5 mg/lit

SiO_2 = 6 mg/lit

Calculate the carbonate and non-carbonate hardness of water sample.

(b) In boiler test, the following quantities were obtained. Mean temperature of feed water is 15 °C, mean boiler pressure is 12 bar, mean steam dryness fraction is 0.95, mass of cool burnt per hour 250 kg; calorific value of coal is 32400 kJ per kg, mass of water supplied to boiler in 7 hour and 14 min is 16500 kg, mass of water in the boiler at the end of the test was less than that at the commencement by 1000 kg.

Calculate :

(i) The actual evaporation per kg of coal

(ii) The equivalent evaporation from and at 100 °C per kg of coal

(iii) Thermal efficiency

(c) Explain the commissioning procedure in details.

6. Solve any TWO : **2 × 6 = 12**

(a) Describe reverse osmosis process in detail.

(b) State the construction and working of Lancashire boiler.

(c) Write a note on sling Psychrometer.
