

Total No. of Questions : 10]

SEAT No. :

P3650

[Total No. of Pages : 4

[5460]-515

T.E. (Mechanical)

REFRIGERATION AND AIR CONDITIONING

(2015 Pattern)

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 4) Assume suitable data, if necessary.

- Q1)** a) Explain importance of refrigeration in dairy industry. [5]  
b) What is the selection criteria for environment friendly refrigerants? Explain with suitable example. [5]

OR

- Q2)** a) What are the LCCP components? Discuss the methodology for calculating LCCP. [6]  
b) Explain the design features of an air conditioning system for hospitals. [4]

- Q3)** a) Compare use of individual expansion vs multiple expansion valve. [4]  
b) Explain Recovery, Recycle and Recharge of refrigerant. [6]

OR

- Q4)** a) 100 TR refrigerant system used for cold storage with ammonia as refrigerant. Evaporation temperature is  $-20^{\circ}\text{C}$  and condensing temperature is  $30^{\circ}\text{C}$ . Find theoretical COP of refrigeration system and power input if there is  $10^{\circ}\text{C}$  subcooling and  $5^{\circ}\text{C}$  superheat. [5]  
b) Explain Linde-Hampson cycle with neat diagram. [5]

- Q5)** a) Explain procedure of heat load calculation. [8]  
b) Write note on: i) IAQ ii) ASHRAE Comfort chart [8]

OR

P.T.O.

- Q6)** a) Explain: SHF, RSHF, ESHF and EHSF. [8]  
 b) 100 cmm air stream at 30°C DBT and 24°C WBT is passed over cooling coil. If coil capacity is 50kW, [8]  
 i) Find air properties at coil exit and moisture removal rate if coil ADP = 15°C  
 ii) If coil capacity reduced by 20%, Find air properties at coil exit & moisture removal rate, if coil ADP is same.

- Q7)** a) With neat schematic explain variable refrigerant flow system. Explain its pros and cons over VAV system. [8]  
 b) Discuss various types of refrigerant condensers. What is their selection criteria? [8]

OR

- Q8)** a) Draw neat diagram of TXV and explain its working. [6]  
 b) Draw the neat diagram of flooded evaporator. Explain its working stating advantages and limitations. Compare it with DX type evaporator. [10]

- Q9)** a) Explain friction and dynamic pressure losses in ducting. [6]  
 b) A circular duct of 400 mm is selected to carry air at a velocity 440 m/min. If duct is replaced by rectangular duct of aspect ratio 1.5, find the size of rectangular duct for equal friction when: [6]  
 i) Velocity in two ducts is same  
 ii) Discharge in two ducts is same  
 If  $f = 0.015$ , find the pressure loss per 100 m length of duct.  
 Take density of air = 1.15 kg/m<sup>3</sup>.  
 c) Explain working of humidity sensor. [6]

OR

- Q10)** a) With neat diagram explain working of AHU. [6]  
 b) Explain static regain method of duct design. [6]  
 c) Explain design consideration of duct system with respect to the followings. [6]  
 i) Duct Insulation  
 ii) Duct System Leakage  
 iii) System and Duct Noise







