PVP 14

Code: ME6T4

III B.Tech - II Semester – Regular/Supplementary Examinations
AUGUST - 2021

REFRIGERATION AND AIR CONDITIONING
(MECHANICAL ENGINEERING)

Note: Refrigeration tables and Psychrometric chart are permitted.

Duration: 3 hours Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Define COP.
b) Why a refrigerator can't work on Carnot cycle in actual practice?
c) Give the difference between open and closed air refrigeration system.
d) What are the primary refrigerants and secondary refrigerants?
e) Give the difference between air cooled and water cooled condensers.
f) What is a cooling tower?
g) Mention the role of hydrogen in an Electrolux refrigeration system.
h) Define Psychrometry.
i) What is Seebeck effect?
j) Define Relative humidity.

k) What do you understand by the term saturated air?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) The capacity of a refrigerator is 200 TR when working between -6^0C and 25^0C. Determine the mass of ice produced per day from water at 25^0C. Also find the power required to drive the unit. Assume that the cycle operates on reversed Carnot cycle and latent heat of ice is 336kJ/kg. 8 M

b) A refrigerator works on Bell-Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10^0C. Air coming out of compressor is cooled to 30^0C before entering the expansion cylinder. Expansion and compression follows the law $pv^{1.35}$=constant. Determine theoretical C.O.P of the system. 8 M

3. a) With the help of neat sketches give the construction and working of a single-stage reciprocating compressor. 8 M

b) Discuss the effects of i) superheating ii) sub cooling the refrigerant on the performance of VCR system. 8 M

4. a) Derive an expression for the maximum COP of Vapour absorption refrigeration system. 8 M

b) With the help of neat sketch explain the working of Vortex tube. State its advantages and disadvantages. 8 M

5. a) Describe the procedure steps to calculate Grand sensible heat factor and its representation on psychrometric chart. 8 M

b) What is human comfort? State & explain the factors which affect the human comfort. 8 M

6. a) With the help of neat sketch explain the working of Year-round air-conditioning system. 8 M

b) Saturated air at 21^0 C is passed through a drier so that its final relative humidity is 20 %. The drier uses silica gel adsorbent. The air is then passed through a cooler until its final temperature is 21^0 C without change in specific humidity. Determine

i) Temperature of air at the end of the drying process.
ii) Heat rejected during the cooling process.
iii) Relative humidity at the end of cooling process.

8 M