Code No: 126AM **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year II Semester Examinations, May - 2016
REFRIGERATION AND AIR CONDITIONING
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) Distinguish between Engine and Refrigerator. [2]
b) What is the difference between expander and compressor? [3]
c) State the various types of evaporations used in refrigeration and air conditioning systems. [2]
d) Explain about recuperation. [3]
e) What are the properties of ideal refrigerant? [2]
f) Differentiate between expansion cylinder and expansion valve. [3]
g) What is the meaning of air conditioning? [2]
h) Explain the relation between wet bulb temperature, sensible heaters, sensible cooling. [3]
i) Explain how to calculate load on occupants. [2]
j) Explain infiltration load. [3]

PART - B

(50 Marks)

2. A Carnot refrigerator operates between the temperatures of -50^0C and 50^0C. Determine COP of the refrigerator. If the COP is to be made 4 by changing the temperatures such that increase or decrease in upper temperature is equal to decrease or increase in lower temperature, determine the new temperatures. [10]

OR

3. A refrigerator working 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 follow the law $p.v^{1.35}$ = constant. Determine C.O.P. of the system. Take $\gamma = 1.4$ and $C_p = 1$ kJ/kg –k for air. [10]

4. Explain with neat sketch the working principle of a screw compressor. [10]

OR

5. Explain with a neat sketch the working principle of Evaporative condenser. [10]

6. In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2 bar and 90^0C dry. The temperature to be maintained in the refrigerator is -5^0C. The temperature of the atmosphere is 30^0C. Find the maximum C.O.P. is 70% of the refrigerator. If the refrigeration load is 20 tons and actual C.O.P. is 70% of maximum C.O.P. Find the mass of steam required per hour. [10]

OR

7. Draw a neat line diagram of Electrolux refrigerator and explain its working principles. What is the important role of hydrogen in this refrigeration system? [10]

8. A four rows coil with a face velocity of 150 m/min has a contact factor of 0.85. Calculate the contact factors for the following cases:
   a) Face velocity 200 m/min and four rows.
   b) Face velocity 100 m/min and four rows
   c) Face velocity 150 m/min and eight rows
   d) Face velocity 150 m/min and two rows. [10]

OR

9. A stream of moist air at 2^0C dry bulb and 80 per cent relative humidity mixes with another stream of moist air at 30^0C dry bulb and 10^0C dew point in the ration by mass of one part of the first to two parts of the second. Calculate the temperature and specific humidity of the air after mixing. [10]

10. A spray cooling oil is chosen to operate under the following conditions:
    Air –inlet condition ……..28^0C DBT and 21^0C WBT
    Air-outlet conditions…….10^0C DBT and 6^0C WBT
    Total amount of air flow ….. 2000 m^3/min.
    The chilled water inlet and outlet temperatures area 7^0C and 12^0C respectively
    Find the following:
    a) The cooling load on the coil.
    b) Water flow rate through the coil. [5+5]

OR

11. Differentiate between Central, District and Unitary air-conditioning systems. [10]

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