MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PE-ME601B/PE-ME602B Refrigeration and Air Conditioning

UPID : 006655

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(i) _____ captures contaminated air.

(ii) What is Absolute humidity?

(iii) What is the function of cooling tower?

(iv) What is the boiling point of Ammonia?

(v) The COP of vapor compression refrigeration compared to simple air refrigeration system is _____ (high / low)

(vi) The Bell-Coleman refrigeration cycle uses _____ as refrigerant

(vii) In which component, the low pressure and temperature vapor refrigerant enters the vapor compression system?

(viii) Which type of compressor is used in a domestic refrigerator?

(ix) What is the condition of refrigerant at the exit of evaporator in aqua-ammonia absorption system?

(x) Rotary compressors are operated at _____ (high / low) pressure

(xi) In a refrigeration cycle, in which component heat absorption takes place?

(xii) Two reversible refrigerators are arranged in series and their COP are 4 and 5 respectively. What is the COP of the composite system?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. What are refrigerants? What is the unit of refrigeration? [5]
3. Write the main components in a Simple Vapor Compression Refrigeration System ? [5]
4. What are the desirable properties of refrigerants? [5]
5. What is the effect in refrigeration cycle with sub cooling and super cooling? [5]
6. What are the different types of Compressors in refrigeration system? Briefly explain each type. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) Discuss the advantages of the dense air refrigeration system over an open air refrigeration system. [7]
   (b) A heat pump works on a reversed Carnot cycle. The temperature in the condenser coils is 27° C and that in the evaporator coils is - 23° C. For a work input of 1 kW, how much is the heat pumped? [8]
8. (a) Discuss a comparative list between a vapor-absorption system and vapor-compression system [5]
   (b) Explain the working principle of a simple three fluid absorption system with the help of a neat schematic diagram. Compare between three fluid and two fluid absorption system. [10]
9. (a) A reversible engine has ideal thermal efficiency of 30%. When it is used as a refrigerating machine with all other conditions unchanged, what will be the coefficient of performance? [7]
   (b) In an ideal VCR cycle , the enthalpy of refrigerant in KJ/Kg at the following states is given - [8]
   inlet of condenser- 283 , exit of condenser- 116
   exit of evaporator- 232 , What is the COP of the cycle?
10. (a) Derive the coefficient of performance of the Bell-Coleman air refrigeration cycle in terms of the pressure ratio r_p. [9]
   (b) A Bell-Coleman air refrigeration cycle works on which cycle? [1]
   (c) Explain with neat sketch the working principle of Thermoelectric Refrigeration. [5]
11. (a) Explain Natural & Mechanical Ventilation. [8]
   (b) Describe Gibbs Dalton law [7]