

**DIPLOMA IN ELECTRICAL AND
MECHANICAL ENGINEERING (DEME)**

00312

Term-End Examination

June, 2010

**BME-032 : REFRIGERATION &
AIR-CONDITIONING**

Time : 2 hours

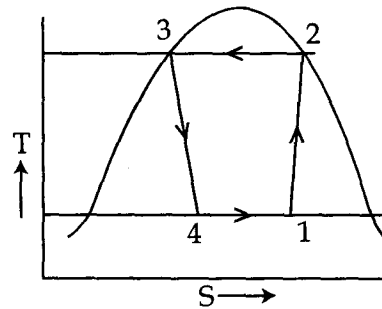
Maximum Marks : 70

Note : All questions are compulsory. Use of calculator is permitted.

1. Select the correct answer from the given *four* alternatives for the following questions : **14x1=14**
- (a) One Ton of Refrigeration (TR) is equal to :
- (i) 200 Btu/min
 - (ii) 50 kCal/min
 - (iii) 3.5 kW
 - (iv) All
- (b) In refrigeration, heat is pumped out from space to an environment :
- (i) lower temperature to higher temperature
 - (ii) higher temperature to lower temperature
 - (iii) same temperature
 - (iv) none of the above

- (c) Ammonia Absorbent systems used
Ammonia as _____ and water as
_____ .
- (i) Absorbent, Refrigerant
 - (ii) Refrigerant, Absorbent
 - (iii) Coolant, Absorbent
 - (iv) Refrigerant, Coolant
- (d) Which one of these is NOT a component of a Vapour Absorption System :
- (i) Absorber
 - (ii) Pump
 - (iii) Compressor
 - (iv) Generator
- (e) The screw compressors are best suited for use with refrigerants which require :
- (i) Large displacement and high condenser pressure
 - (ii) Small displacement and high condenser pressure
 - (iii) Large displacement and low condenser pressure
 - (iv) Small displacement and low condenser pressure
- (f) In Shell and Tube condenser refrigerant remains in :
- (i) Tube
 - (ii) Shell
 - (iii) Coil
 - (iv) Valve

- (g) Viscosity of a refrigerant should be :
- (i) As high as possible
 - (ii) As small as possible
 - (iii) Medium
 - (iv) None of the above
- (h) Which of the following refrigerant has a zero ozone depleting potential :
- (i) HCFC 22
 - (ii) HCFC 123
 - (iii) HCFC 124
 - (iv) HFC 134 a
- (i) Given below is the T-S diagram of a simple Vapor Compression cycle :



h denotes the specific enthalpy of refrigerant. COP is given by :

(i) $\frac{(h_1 - h_4)}{(h_2 - h_1)}$ (ii) $\frac{(h_2 - h_1)}{(h_1 - h_4)}$

(iii) $\frac{(h_3 - h_4)}{(h_1 - h_4)}$ (iv) $\frac{(h_4 - h_1)}{(h_1 - h_2)}$

- (j) Decrease in Evaporator pressure of a vapor compression system results in :
- (i) Decrease in COP and capacity
 - (ii) Increase in COP and capacity
 - (iii) Decrease in COP and increase in capacity
 - (iv) Increase in COP and decrease in capacity
- (k) The properties of moist air are called :
- (i) Thermodynamic properties
 - (ii) Relative properties
 - (iii) Psychrometric properties
 - (iv) None of the above
- (l) The difference between the dry bulb and wet bulb temperatures is called :
- (i) Dry bulb Depression
 - (ii) Dryness fraction
 - (iii) Wetness factor
 - (iv) Wet bulb Depression
- (m) Which one is NOT a type of Freezer ?
- (i) Air - blast freezer
 - (ii) Plate freezer
 - (iii) Tube freezer
 - (iv) Spray freezer

- (n) The Freezing point of wine vary between :
- (i) -10 to -5°C
 - (ii) -13 to -6°C
 - (iii) -15 to -25°C
 - (iv) -4 to -2°C

2. Answer *any two* of the following :

- (a) (i) List any Eight applications of air conditioning. **4+3**
- (ii) Define ton of Refrigeration, Refrigeration effect and COP.
- (b) What are the conditions for Highest COP. **7**
Explain the effects on P-h diagram.
- (c) Five hundred kgs of fruits are supplied to a cold storage at 20°C . The cold storage is maintained at 5°C and the fruits get cooled to the storage temperature in 10 hrs. The latent heat of freezing is 105 kJ/kg and specific heat of fruit is 1.256 kJ/kg K . Find the refrigeration capacity of the plant. **7**

3. Answer *any two* of the following :

- (a) Name different types of compressor and mention their suitability of applications. Write working of screw compressor. **4+3**
- (b) What are different types of condensers used in refrigeration ? Explain the working of Evaporative condenser. **4+3**
- (c) What are the different types of Evaporators ? Explain in short any one type of Evaporator. **4+3**

4. Answer *any two* of the following :

- (a) Discuss the desirable thermodynamic, **4+3** chemical and physical properties of refrigerants.
- (b) Describe a Carnot vapour compression cycle **4+3** and discuss that it cannot be used in practice.
- (c) Distinguish between specific humidity and **5+2** relative humidity. How ϕ and μ are related.

5. Answer *any two* of the following :

- (a) What are different steps in food **7** preservation ?
- (b) Describe various types of Freezers. **7**
- (c) Differentiate between :
 - (i) Primary and secondary Refrigerants
 - (ii) Marine and Truck Refrigeration **3¹/₂+3¹/₂**