

**DIPLOMA IN MECHANICAL ENGINEERING  
(DME) / ADVANCED LEVEL CERTIFICATE  
COURSE IN MECHANICAL ENGINEERING  
(DMEVI / ACMEVI)**

**Term-End Examination**

**December, 2015**

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

*Time : 2 hours*

*Maximum Marks : 70*

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*Note : Answer any five questions. Question no. 1 is compulsory. All questions carry equal marks. Assume missing data, if any. Use of calculator is allowed.*

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1. Select the correct answer from the given four alternatives for the following questions :  $7 \times 2 = 14$
- (a)  $\text{CHClF}_2$  is the chemical formula for
- (i) Refrigerant R22
  - (ii) Refrigerant R12
  - (iii)  $\text{CO}_2$
  - (iv) Ammonia

- (b) Heat pump delivers heat from
- (i) Lower temperature to higher temperature
  - (ii) Higher temperature to lower temperature
  - (iii) Both (i) and (ii)
  - (iv) None of the above
- (c) A heat engine working on the Carnot cycle is
- (i) Less efficient
  - (ii) Moderately efficient
  - (iii) Highly efficient
  - (iv) Not efficient
- (d) The C.O.P. of Carnot refrigerator is
- (i)  $\frac{T_1}{T_1 - T_2}$
  - (ii)  $\frac{T_1}{T_2 - T_1}$
  - (iii)  $\frac{T_2}{T_2 - T_1}$
  - (iv)  $\frac{T_2}{T_1 - T_2}$

- (e) During sensible cooling, wet bulb temperature
- (i) Decreases
  - (ii) Increases
  - (iii) Remains constant
  - (iv) Can decrease or increase
- (f) One Ton of Refrigeration (TR) is equal to
- (i) 200 Btu/min
  - (ii) 50 kCal/min
  - (iii) 3.5 kW
  - (iv) All of the above
- (g) Water and brine solutions are examples of
- (i) Primary refrigerants
  - (ii) Secondary refrigerants
  - (iii) None of the above
  - (iv) Both (i) and (ii)
2. (a) What are the different types of condensers used in a refrigeration system ? Explain the working of any condenser. 7
- (b) What are the different types of evaporators ? Explain in short any one type of evaporator. 7
3. (a) With the help of a psychrometric chart, distinguish between specific humidity and relative humidity. 7

- (b) Describe the different steps in food preservation. 7
4. (a) 40,000 kg/day of fish is to be frozen to  $-35^{\circ}\text{C}$ . The fish enters at  $35^{\circ}\text{C}$ . Calculate the refrigeration duty of the plant for 20 hours running time. 7
- Given :
- Specific heat of fish =  $3.77 \text{ kJ/kg}^{\circ}\text{C}$ ,  
 Latent heat of fusion of fish =  $251.2 \text{ kJ/kg}$ ,  
 Specific heat of frozen fish =  $1.67 \text{ kJ/kg}^{\circ}\text{C}$ .
- (b) State the factors which should be taken into consideration while selecting a system of air-conditioning. 7
5. (a) The coefficient of performance of a Carnot refrigerator, when it extracts  $8350 \text{ kJ/min}$  from a heat source, is 5. Find the power required to run the compressor. 7
- (b) Differentiate clearly between open and closed air refrigeration system. 7
6. (a) Sketch a vapour absorption refrigeration cycle and mark necessary components. 7
- (b) Differentiate between centrifugal and rotary compressors. Also state their applications. 7