# DIPLOMA IN MECHANICAL ENGINEERING (DME) / ADVANCED LEVEL CERTIFICATE COURSE IN MECHANICAL ENGINEERING (DMEVI / ACMEVI)
## Term-End Examination
00482        **December, 2016**

## BME-032 : REFRIGERATION AND AIR-CONDITIONING

*Time : 2 hours*                    *Maximum Marks : 70*

**Note :** *Answer all the questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1.  Choose the correct answer from the given four alternatives :                    *7×2=14*

    (a)  When air is adiabatically saturated, the temperature attained is

        (i)    dew point temperature

        (ii)   dry bulb temperature

        (iii)  wet bulb temperature

        (iv)   triple point temperature

(b)   Wet bulb depression represents the difference between

   (i)   dry bulb temperature and wet bulb temperature

   (ii)  dry bulb temperature and dew point temperature

   (iii) dew point temperature and saturation temperature

   (iv)  adiabatic saturation temperature and dew point temperature

(c)   For a given dry bulb temperature as the relative humidity decreases, the wet bulb temperature will

   (i)   increase

   (ii)  decrease

   (iii) be the same

   (iv)  depend on other factors

(d)   The saturation temperature at the partial pressure of water vapour in the air-water vapour mixture is called

   (i)   dry bulb temperature

   (ii)  wet bulb temperature

   (iii) dew point temperature

   (iv)  saturation temperature

(e)   In an ideal refrigeration (reversed Carnot) cycle, the condenser and evaporator temperatures are 27°C and −13°C respectively. The COP of this cycle would be

(i)   6·5

(ii)  7·5

(iii) 10·5

(iv)  15·0

(f)   Vapour absorption refrigeration system works using the

(i)   ability of a substance to get easily condensed or evaporated

(ii)  ability of a vapour to get compressed or expanded

(iii) affinity of a substance for another substance

(iv)  absorptivity of a substance

(g)   In a vapour compression system, the working fluid is superheated vapour at the entrance to

(i)   evaporator

(ii)  condenser

(iii) compressor

(iv)  expansive valve

**2.** Answer any *two* of the following : $2 \times 7 = 14$

(a) Explain vapour compression refrigeration system with the help of a block diagram.

(b) What is refrigerating effect ? Show that the COP of a heat pump is greater than the COP of a refrigerator by unity.

(c) A domestic food freezer maintains a temperature of $-15°C$. The ambient air temperature is $30°C$. If heat leaks into the freezer at the continuous rate of $1.75$ kJ/sec., what is the least power necessary to pump this heat out continuously ?

**3.** Answer any *two* of the following : $2 \times 7 = 14$

(a) Derive the expression for the maximum COP of a vapour absorption refrigeration system.

(b) What do you understand by dry bulb temperature and wet bulb temperature ? Also define dew point temperature.

(c) Explain the concept of defrosting. How is defrosting achieved in a domestic refrigerator ?

4. Answer any *two* of the following : 2×7=14

   (a) Explain the advantages of central air-conditioning system over unitary air-conditioning system.

   (b) Why is transport refrigeration necessary ? List the commodities (items) preserved during transport refrigeration.

   (c) A Carnot refrigerator requires 1·3 kW per tonne of refrigeration to maintain a region at low temperature of − 38°C.

   Determine :

   (i) COP of the Carnot refrigerator

   (ii) Higher temperature of the cycle

5. Write short notes on any *four* of the following : $4×3\frac{1}{2}=14$

   (a) Secondary Refrigerants

   (b) Depletion of Ozone Layer

   (c) Specific Humidity

   (d) Relative Humidity

   (e) Air Filter

   (f) Desirable Properties of Refrigerants

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