BME-032

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

Term-End Examination

June, 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 permitted.*

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

    (a) A condenser of a refrigeration system rejects heat at a rate of 120 kW while the compressor consumes power of 30 kW. The coefficient of performance of the system would be

    (i) 1/4

    (ii) 4

    (iii) 1/3

    (iv) 3

(b) A refrigerating machine working on reversed Carnot cycle takes out 2 kW of heat from the system while working between the temperature limits of 300 K and 200 K. The COP and power consumed are respectively

    (i)   1 and 1 kW

    (ii) 1 and 2 kW

    (iii) 2 and 2 kW

    (iv) 2 and 1 kW

(c) The refrigerant used for absorption refrigerators working on heat from solar collectors is a mixture of water and

    (i)   Carbon dioxide

    (ii) Sulphur dioxide

    (iii) Lithium bromide

    (iv) Freon-12

(d) During the adiabatic cooling of moist air

    (i)   DBT remains constant

    (ii) Specific humidity remains constant

    (iii) Relative humidity remains constant

    (iv) WBT remains constant

(e) A humidification process means

(i) a decrease in relative humidity

(ii) an increase in specific humidity

(iii) a decrease in temperature

(iv) an increase in temperature

(f) Air refrigeration cycle is used in

(i) commercial refrigerators

(ii) domestic refrigerators

(iii) gas liquefaction

(iv) air-conditioning

(g) In a refrigerator plant, if the condenser temperature increases, the power input to the compressor will

(i) decrease

(ii) increase

(iii) remain the same

(iv) be unpredictable

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

(a) What is refrigeration ? How is (i) ice, and (ii) dry ice used for the purpose of refrigeration ?

(b) What do you understand by dry and wet compression ? Which is preferred and why ?

(c) A cold storage is to be maintained at – 5°C while the surroundings are at 35°C. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual COP of the refrigeration plant used is one-third that of an ideal plant working between the same temperature. Find the power required (in kW) to drive the plant.

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

(a) Explain in brief vapour absorption refrigeration system with the help of a neat diagram.

(b) What do you understand by saturated air and unsaturated air ? What is specific humidity ? When does it became maximum ?

(c) Explain why window air-conditioners are preferred in homes and offices.

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

(a) Determine the ideal COP of a vapour absorption refrigerating system in which the heating, cooling and refrigeration take place at 197°C, 17°C and – 3°C, respectively.

(b) List some applications of refrigeration. What is the need to preserve food ? What are cold storages ? Why are they used ?

(c) The capacity of a refrigerator (working on reversed Carnot cycle) is 280 tonnes when operating between $-10°C$ and $25°C$.

Determine :

(i) Quantity of ice produced within 24 hours when water is supplied at $20°C$.

(ii) Minimum power (in kW) required.

5. Write short notes on any **four** of the following :
$$4\times3\frac{1}{2}=14$$

(a) COP of a Refrigerator

(b) Cascade Refrigeration

(c) Expansion Valve

(d) Global Warming

(e) Ton of Refrigeration

(f) Evaporator

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