BME-032

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

03133

Term-End Examination
December, 2012

BME-032 : REFRIGERATION AND AIR-CONDITIONING

Time : 2 hours   *Maximum Marks : 70*

*Note :   Answer five questions in all. **Question No. 1** is **Compulsory**. Answer four more questions from the remaining five questions. Use of calculator is **permitted**.*

1.   (a)   The purpose of air-conditioning is to control :

(i)   temperature only   2x7=14

(ii)   humidity only

(iii)   cleanliness and air motion

(iv)   all of the above

(b)   The density of the refrigerant should be

(i)   large

(ii)   medium

(iii)   small

(iv)   any value as density does not play any role.

(c) A heat engine working on the Carnot cycle is :

(i) Less efficient   (ii) Highly efficient

(iii) Medium efficient (iv) Not efficient

(d) An ideal refrigerant should possess the following physical properties :

(i) Non - toxicity

(ii) Non - flamable

(iii) Non - corrosiveness

(iv) None of the above

(e) Ammonia (NH_3) refrigerant possess the following properties.

(i) It is highly toxic

(ii) It has the excellent thermal properties

(iii) Low cost

(iv) All of the above

(f) In an unsaturated air the state of a vapour is

(i) wet   (ii) superheated

(iii) saturated (iv) unsaturated

(g) With increase in clearance volume, the ideal work of compressing 1kg of air

(i) increases

(ii) decreases

(iii) remains same

(iv) first increases and then decreases

2. (a) A Carnot refrigerator requires 1.3 kW per tonne of refrigeration to maintain a region at low temperature of $-38°C$. Determine :

(i) C.O.P. of Carnot refrigerator   7x2=14

(ii) Higher temperature of the cycle

(b) 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 C.O.P of the refrigeration plant used is one third that of an ideal plant working between the same temperatures. Find the power required to drive the plant.

3. (a) Explain briefly an air refrigerator working on a reversed Carnot cycle. Derive expression for its C.O.P.   7x2=14

(b) State merits and demerits of 'Vapour compression system' over 'Air refrigeration system'.

4. (a) What are the different types of Evaporators ? Explain in short any one type of Evaporator.   7x2=14

(b) What are the different types of condensers used in refrigeration? Explain the working of Evaporative condenser.

5. (a) Explain the working principle of vapour compression refrigeration system with a neat sketch and a T-S diagram. **7x2=14**

   (b) What is a psychrometric chart ? Explain the lines represented on a psychrometric chart.

6. (a) Discuss the effect of the following on the performance of a vapour compression system : **7x2=14**

   (i) Effect of super heating

   (ii) Effect of sub-cooling of liquid.

   (b) What do you understand about refrigeration? List any five refrigerants. Also list the components of refrigeration system.

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