No. of Printed Pages : 4

BME-032

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

Term-End Examination

00631

June, 2015

BME-032 : REFRIGERATION AND AIR-CONDITIONING

Time : 2 hours *Maximum Marks : 70*

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

1. Select the correct answer from the given four alternatives for the following questions : *7×2=14*

(i) The purpose of air-conditioning is to control
- (a) temperature only
- (b) humidity only
- (c) cleanliness only
- (d) All of the above

(ii) In a refrigeration system the refrigerant rejects heat at
- (a) evaporator
- (b) expansion valve
- (c) condenser
- (d) compressor

(iii) To have a comfortable drive in the car, the temperature inside the car has to be maintained at

(a) 40°C

(b) 30°C

(c) 25°C

(d) 15°C

(iv) COP of a refrigeration system is

(a) $\frac{\text{Input}}{\text{Output}}$

(b) $\frac{\text{Output}}{\text{Input}}$

(c) $\frac{\text{Refrigeration effect}}{\text{Energy input}}$

(d) $\frac{\text{Energy input}}{\text{Refrigeration effect}}$

(v) The required storage temperature for milk is

(a) 0·5°C

(b) 1·5°C

(c) 2·0°C

(d) 2·5°C

(vi) The density of refrigerant should be

(a) small

(b) large

(c) medium

(d) None of the above

(vii) The most common refrigerant used in the vapour compression cycle is _____ .

(a) R-11

(b) CO

(c) CO_2

(d) H_2SO_4

2. (a) A freezer is to be maintained at a temperature of 238 K, when the ambient temperature is 306 K. In order to maintain the freezer box at 238 K, it is necessary to remove heat from it at the rate of 2,460 J/sec. What is the coefficient of performance of the freezer and what is the minimum power that must be supplied to the freezer ?

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

(i) COP of Carnot refrigerator.

(ii) Higher temperature of the cycle. 7+7

3. (a) Name the various types of compressors. Describe in detail about any two compressors.

(b) Define the term Condenser. Explain the functioning of air-cooled condensers. 7+7

4. (a) Describe the desirable thermodynamic chemical and physical properties of refrigerants.

(b) Differentiate between primary and secondary refrigerants. 7+7

5. (a) The COP of a wet ideal vapour compression refrigeration system of capacity 5 tons is given to be 3. Work supplied to the compressor is 20 kJ/kg. Find the mass flow rate of the refrigerant and the refrigerating effect.

(b) 48,000 kg/day of cold fish is to be frozen to – 35°C in 18 cm thick blocks each weighing 60 kg. The freezing cycle time may be taken as 6 hours. Calculate the number of blocks frozen per cycle. 7+7

6. (a) What are the various factors which are contributing to food spoilage ? List the causes of food spoilage.

(b) Discuss the concepts of food freezing, storage conditions and distribution. 7+7