No. of Printed Pages : 3

**BIMEE-032**

# DIPLOMA – VIEP – MECHANICAL ENGINEERING (DMEVI)

## Term-End Examination

00475

## December, 2014

## BIMEE-032 : REFRIGERATION SYSTEM

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

***Note :*** *Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

**1.** (a) Distinguish between a heat pump and a refrigerator. *7*

(b) Explain briefly an air refrigerator working on a reversed Carnot cycle. Derive expression for its C.O.P. *7*

**2.** The capacity of a refrigerator is 600 tons when working between –5°C and –20°C. Find the mass of the ice produced within 24 hours when water is supplied at 10°C. Also find the minimum power required. *14*

3. An $NH_3$ refrigerator produces 30 tons of ice from and at 0°C in a day. The temperature range of the working cycle is 25°C to –15°C. The vapour is dry saturated at the end of compression. Assuming actual C.O.P. 60% (theoretical), calculate the power (in kW) required to drive the compressor. Take the properties of $NH_3$ from the following table : *14*

| Temperature °C | Liquid | | Vapour | |
|---|---|---|---|---|
| | $H_f$ (kJ/kg) | $S_f$ (kJ/kg-K) | $H_g$ (kJ/kg) | $S_g$ (kJ/kg-K) |
| 25 | 100·4 | 0·35 | 1324·3 | 4·5 |
| – 15 | – 54·7 | – 0·214 | 1310 | 5·08 |

4. (a) In an absorption refrigeration system, heating, cooling and refrigeration take place at the temperatures of 150°C, 30°C and – 20°C respectively. Find the C.O.P. of the system. *7*

(b) If in the above question, the heating temperature is increased to 200°C and refrigeration temperature is decreased to – 40°C, calculate the percentage change in C.O.P. *7*

5. In an absorption refrigeration system, the heating in generator is carried out by using steam at 3 bar and 85% dry. The refrigeration temperature is –10°C. The condensation of the refrigerant is carried out at 30°C using cooling water. Determine *14*

   (a) the maximum possible C.O.P. of the system.

   (b) if the steam leaves the generator as saturated water at same pressure, determine the quantity of the steam required to run a plant of 20 tons capacity. Assume relative C.O.P. = 0·4.

6. (a) Describe the steam jet refrigeration system. *7*

   (b) Explain the effect of super-heat and sub-cooling on the vapour compression cycle. *7*

7. Write short notes on any ***two*** of the following : *7+7*

   (a) Multi Pressure System

   (b) Properties of refrigerants

   (c) Production of low temperature