C14–M–**602**

# 4752

**BOARD DIPLOMA EXAMINATION, (C–14)**

**MARCH/APRIL—2018**

**DME—SIXTH SEMESTER EXAMINATION**

REFRIGERATION AND AIR-CONDITIONING

*Time* : 3 hours ]  [ *Total Marks* : 80

**PART—A**  3×10=30

*Instructions* : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Explain the term 'ton of refrigeration'.

2. State the purpose of flash chamber in the vapour compression refrigeration system.

3. State the advantages and limitations of lithium bromide absorption system.

4. Define a 'refrigerant'. List common refrigerants.

5. Differentiate between water-cooled and air-cooled condensers.

6. List the factors which affect the human comfort.

7. Define the term 'psychometry'. State its importance in the field of air-conditioning.

**8.** Represent heating and dehumidification processes on psychometric chart.

**9.** Define the following terms :

*(a)* Wet bulb temperature

*(b)* Dry bulb temperature

**10.** State the advantages of unitary air-conditioning system.

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**PART—B**            10×5=50

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*Instructions* : (1) Answer *any* **five** questions.

                (2) Each question carries **ten** marks.

                (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

**11.** Draw *P-V* and *T-S* diagrams of Bell-Coleman cycle and derive the equation for COP.

**12.** A vapour compression refrigerator operates with an evaporation temperature of 20 °C and condenser temperature of 35 °C. The rate of removal of thermal energy from the closed chamber is 3·5 kW. Assume that the vapour leaving the compressor and liquid leaving the condenser are saturated. The properties of the refrigerant are given below :

| Temp °C | Pressure | Specific Enthalpy, kJ/kg | | Specific Entropy, kJ/kgK | |
|---|---|---|---|---|---|
| | MPa | *Saturated liquid* | *Saturated vapour* | *Saturated liquid* | *Saturated vapour* |
| 20 | 0·151 | 17·8 | 178·6 | 0·073 | 0·708 |
| 35 | 0·848 | 69·49 | 201·3 | 0·256 | 0·683 |

*(a)* Indicate the process on a pH diagram.

*(b)* Calculate the COP, mass flow rate of refrigerant and the power required.

**13.** Explain the working principle of electrolux refrigerating system with a legible sketch.

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**14.** With the help of sketches, explain the working of the following components :

*(a)* Shell and coil condensers

*(b)* Flooded-type evaporator

**15.** Draw a legible sketch of watercooler and explain its working principle.

**16.** *(a)* Explain the working of electrostatic filter with a legible sketch.

*(b)* Explain downward system of air distribution system in air-conditioning.

**17.** Humid air at 30 °C DBT and 21 °C WBT is cooled to 20 °C without removal of moisture. Find the relative humidity and DPT of air in the final state. Calculate the change in enthalpy.

**18.** Explain the working of 'central air-conditioning system' with the help of a legible diagram.

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