

**DIPLOMA - VIEP - MECHANICAL
ENGINEERING (DMEVI)**

Term-End Examination

00183

December, 2016

BIMEE-032 : REFRIGERATION SYSTEMS

Time : 2 hours

Maximum Marks : 70

Note : Answer *five* questions in all. Question no. 1 is *compulsory*. All questions carry equal marks. Use of scientific calculator is permitted.

1. Choose the correct answer from the given four alternatives :

$7 \times 2 = 14$

- (a) In a mechanical refrigeration system, the highest temperature of refrigerant occurs
- (i) Between condenser and evaporator
 - (ii) In evaporator
 - (iii) Between compressor and condenser
 - (iv) Before expansion valve
- (b) Defrosting of evaporators is done because
- (i) Frosting is undesirable
 - (ii) Frosting increases refrigerant effect
 - (iii) Frosting retards heat flow
 - (iv) Frosting obstructs flow of refrigerant

- (c) In a refrigeration cycle, the heat is rejected by the refrigerant at
- (i) Evaporator
 - (ii) Condenser
 - (iii) Expansion valve
 - (iv) Compressor
- (d) The most common type of vapour absorption system in use for industrial application is
- (i) Freon 12 and water
 - (ii) Freon 22 and water
 - (iii) Ammonia and water
 - (iv) Hydrogen and water
- (e) If the compressor of a refrigeration system is noisy, it shows that
- (i) Compressor drive coupling is loose
 - (ii) There is lack of oil
 - (iii) Internal parts of the compressor are broken
 - (iv) Any of the above
- (f) The heat removal capacity of a one-ton refrigerator is
- (i) 400 kJ/min
 - (ii) 100 kJ/min
 - (iii) 50 kcal/min
 - (iv) 50 kJ/min

- (g) In a refrigerator, the evaporator is located
- (i) On the bottom of the refrigerator
 - (ii) Behind the refrigerator cabinet
 - (iii) Adjacent to the compressor
 - (iv) Inside the refrigerator cabinet

2. (a) Define the COP of a refrigerator. Show that the COP of a heat pump is greater than the COP of a refrigerator by unity.

- (b) A refrigeration cycle absorbs heat at -3°C and rejects it at 27°C . Calculate its COP. $2 \times 7 = 14$

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

- (b) Calculate how many kJ/min will the heat pump deliver at 27°C , if it absorbs 1130 kJ/min at -3°C . The COP of the heat pump is 10. $2 \times 7 = 14$

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

- (b) In a cold storage plant, fish is supplied at a temperature of 30°C . The fish is stored in cold storage which is maintained at -8°C . The freezing point of fish is -4°C .

If $(\text{COP})_{\text{actual}} = 0.3$ of $(\text{COP})_{\text{theoretical}}$, determine the actual COP of the refrigeration plant. $2 \times 7 = 14$

5. (a) What is a multistage vapour compression plant? When is it used?
- (b) In an absorption refrigeration system, the saturation temperature of steam at a pressure of 2 bar is 119.62°C . The temperature in the refrigerator is to be maintained at -5°C . The atmospheric temperature is 30°C . Find the maximum COP of the vapour absorption refrigeration system. $2 \times 7 = 14$
6. (a) What are the most widely used refrigerants?
- (b) A refrigerating machine working on reversed Carnot cycle takes out 2 kW of heat from the system while working between temperature limits of 300 K and 200 K. Calculate the COP and power consumed by the cycle. $2 \times 7 = 14$
7. (a) What is a vapour absorption refrigeration cycle? How does it differ from the vapour compression cycle?
- (b) COP_{ref} of a reversed Carnot cycle is 5. What is the ratio of the highest absolute temperature to the lowest absolute temperature? $2 \times 7 = 14$
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