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**Unit-V**

5. a) Define bypass factor of coil.
- b) Explain the difference between winter air conditioning and summer air conditioning.
- c) Write short note on "Air distribution system and ventilation systems".
- d) An air conditioned space is maintained at 27°C DBT and 50% RH. The ambient conditions are 40°C DBT and 27°C WBT. The space has a sensible heat gain of 14 kW. Air is supplied to the space at 7°C saturated.

Calculate :

- i) Mass of moist air supplied to the space in kg/h
- ii) Latent heat gain of space in kW.
- iii) Cooling load of the air washer in kW if 30% of the air supplied to the space is fresh. The remainder being recirculated.

OR

Define cooling load? What are the different factors considered in load estimation for comfort application?

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Total No. of Questions :5]

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**AU/ME-803**

**B.E. VIII Semester**

Examination, December 2016

**Refrigeration and Air Conditioning**

Time : Three Hours

Maximum Marks : 70

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
- ii) All parts of each question are to be attempted at one place.
- iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
- iv) Except numericals, Derivation, Design and Drawing etc.
- v) Use of refrigerant tables and charts; psychrometric chart is permitted.

**Unit - I**

1. a) Define "Refrigeration" and "One ton of refrigeration".
- b) How can throttling be used for production of cooling?
- c) Describe briefly the simple aircraft refrigeration system.
- d) A reversed Carnot cycle has refrigerating COP of 5.

i) Determine the ratio  $\frac{T_2}{T_1}$ ;

- ii) If the work done on the cycle is 8 kW, determine the maximum refrigeration effect in ton,
- iii) If this cycle is used as heat pump, determine the COP and heat delivered.

$T_1$  is lower temperature and  $T_2$  is higher temperature.

OR

A refrigerator unit working on Bell-Coleman cycle takes air from cold chamber at  $-10^{\circ}\text{C}$  and compresses it from 1 bar to 6.5 bar with index of compression being 1.2. The compressed air is cooled to a temperature  $5^{\circ}\text{C}$  above the ambient temperature of  $25^{\circ}\text{C}$  before it expanded in the expander where the index of expansion is 1.35.

Determine :

- i) COP
- ii) Quantity of air circulated per minute for production of 2000 kg of ice per day at  $0^{\circ}\text{C}$  from water at  $20^{\circ}\text{C}$ .
- iii) Capacity of the plant in ton of refrigeration. Assume  $C_p$  of air as 1 kJ/kgK.

#### Unit-II

2. a) Explain the important components of a simple vapour compression system.
- b) What is the difference between "Wet compression" and "Dry compression"?
- c) Discuss the effect of condenser and evaporator pressure on the performance of a vapour compression system.
- d) Why is multi-stage refrigeration employed when the difference between the upper and lower temperature limit is large? What is the function of flash intercooler provided in a compound vapour compression refrigerating system?

OR

In a 6 kW cooling capacity refrigeration system operating on a simple vapour compression cycle, the refrigerant enters the evaporator with an enthalpy of 75 kJ/kg and leaves with an enthalpy of 183 kJ/kg. The enthalpy of the refrigerant after compression is 210 kJ/kg. Show the cycle on T-S and p-h diagrams.

Calculate the following :

- i) COP
- ii) Power input to compressor, and
- iii) Rate of heat transfer at the condenser.

#### Unit-III

3. a) Which components of the simple vapour-absorption? System replaces the compressor of a vapour compression system.
- b) Write some desired characteristics of refrigerants.
- c) Write short note on environment friendly refrigerants.
- d) Explain Electrolux refrigeration system. How the system is operated to obtain different pressure in the cycle without a pump?

OR

Explain the various components of steam-Jet Refrigeration system and clearly discuss the function of each component.

#### Unit-IV

4. a) Define specific humidity and relative humidity.
- b) Define sensible heat factor. What is its Importance.
- c) Show the cooling and dehumidification process on the psychrometric chart.
- d) State the factors that determine human comfort sketch "comfort chart" and show on it the "comfort zone".

OR

At a place the barometric reading is 680mm of Hg. Dry bulb temperature is  $35^{\circ}\text{C}$  and wet bulb temperature is  $25^{\circ}\text{C}$ . Determine :

- i) Specific humidity
- ii) Specific volume
- iii) Specific enthalpy and
- iv) Relative humidity