Sensible heat gain per person	= 58 W
Latent heat gain per sitting person	= 44 W
Latent heat gain per employee	= 76 W
Sensible heat added from meals	= 0.17 kW
Latent heat added from meals	= 0.3 kW
Motor power connected to fan	= 7.6 kW

If the fan is situated before the conditioner, then find the following :

(a) Amount of air delivered to the room in m^3/h;

(b) Percentage of re-circulated air;

(c) Refrigeration load on the coil in tones of refrigeration; and

(d) Dew point temperature of the cooling coil and by-pass factor. 20

9. (a) Write a short note on type of refrigeration compressors. 10

(b) What are the points to be consider for selecting a condenser for a refrigeration system. 10

B.Tech. 7th Semester (ME) F. Scheme
Examination, May– 2017
REFRIGERATION AND AIR CONDITIONING
Paper - ME-403-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions in all, **Question No. 1** is **compulsory**, select at least **one** question from each section.*

1. (a) What are differences between a Heat Engine, Refrigerator and Heat Pump? 4

(b) Define the principle of Steam-jet Refrigeration system. 2

(c) What are the secondary refrigerants ? 2

(d) Write the chemical formula for R11 and R100. 2

(e) Define 1 tone of refrigeration. 2

(f) What do you mean by by pass factor ? 2

(g) Define Specific humidity and Relative humidity. 2

(h) Which evaporator is used in home freezer ? 2

(i) Name the equipment which can sense temperature. 2

Section-A

2. What is Refrigerant ? How can you classify the refrigerants ? Explain the Desirable properties of a good refrigerant. 20

3. A refrigeration machine using R-12 as working fluid works between the temperature - 18°C and 37°C. The enthalpy of fluid at 37°C is 78 kJ/kg. The enthalpies of R-12 entering and leaving the compressor are 200 kJ/kg respectively. The rate of circulation of refrigeration is 2kg/min and efficiency of compressor is 0.85. Determine : Capacity of the plant in tons of refrigeration. Power required to run the plant, COP of the plant. 20

Section-B

4. Explain the Simple Vapour Compression Refrigeration systems and also discuss the Limitations of Reversed Carnot cycle with vapour as the refrigerant. 20

5. Discuss the Properties of aqua ammonia and Electrolux Refrigeration process. 20

Section-C

6. Explain the term Gibbs Dalton Law. Properties of moist air and degree of saturation. 20

7. The following data were collected for designing the air-conditioning system of a small auditorium : Total seating capaity : 400, Out-door conditions : 350 C DBT and 76% R.H. required comfort conditions : 200 C DBT and 53% R.H.. Sensible heat given out per person : 300kJ/Hr. Latent heat given out per person : 100 kJ/hr.

other sensible heat load 150,000 kJ/hr, Latent heat load of in itiration : 1,00,000 kJ/hr, Quantity of fresh air supplied 28 m^3/hr/person, desirable temperature rise of conditioned air within the theatre 9 °C. Calculate :

(a) Percentage of total air recirculated and bypassed

(b) Volume capacity of the fan

(c) The capacity of the cooling coil in tons of refrigeration. Take 20% safe margin.

Assume that air leaves dehumidifying coil with 100% R.H. 20

Section-D

8. An air conditioning system is designed for a restaurant when the following data is available :

Total heat flow through the walls roof and floor	= 6.2kW
Solar heat gain through glass	= 2kW
Equipment sensible heat gain	= 2.9kW
Equipment latent heat gain	= 0.7kW
Total infiltration air	= 400m^3/h
Outdoor conditions	= 35°C DBT, 26°C WBT
Inside designed conditions	= 27°C DBT, 55% RH
Minimum temperature of air supplied to room	=17° C DBT
Total amount of fresh air supplied	= 1600 m^3/h
Seating chairs for dining	= 50
Employees serving the meals	= 5