

B.Tech. 7th Semester (F) Scheme (ME) Examination,

December-2018

REFRIGERATION AND AIR-CONDITIONING

Paper-ME-403-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : *Students are required to attempt any five questions.*

The students have to attempt first common question, which is compulsory and one question from each of the four sections.

1. (a) Relative COP
- (b) Properties of aqua-ammonia
- (c) Specific humidity
- (d) Temperature sensors 5×4=20

Section-A

2. (a) What are various desirable properties of refrigerants ? 10
- (b) Explain the working of Carnot refrigeration cycle with its limitations. 10
3. An aircraft refrigeration system has to handle a cabin load of 30 tonnes. The atmospheric temperature is 15° C. The atmospheric air is compressed to a pressure

of 0.9 bar and temperature of 30° C due to ram action. The temperature of the air is reduced by 50° C in the heat exchanger. The pressure in the cabin is 1.01 bar and the temperature of air leaving the cabin is 25° C. Determine:

- (i) The power required to take the load of cooling in the cabin.
- (ii) COP of the system. Assume pressure of compressed air as 3.5 bar. 20

Section-B

4. A three stage ammonia refrigeration system with flash intercooling operates between the overall pressure limits of 2 bar and 12 bar. The flash intercooling pressures are 4 bar and 8 bar. The load on the evaporator is 10 tonnes of refrigeration. Find out:

- (i) The power required to run the system
- (ii) Compare the COP of the system with that of simple saturation cycle working between the same overall limits. 20

5. Explain the following:

- (a) Practical vapour absorption system 10
- (b) Steam jet refrigerating system 10

Section-C

6. Room air at 20° C DBT and 60% RH is mixed with outdoor air at 40° C DBT and 40% RH in the ratio 4:1. The mixture is passed through a cooling coil whose temperature is maintained at 9° C and whose by pass factor is 0.25. Find:

- (i) Condition of air entering the coil
- (ii) Condition of air leaving the coil
- (iii) If 250 m³/min of air is supplied to the room find the refrigeration load on the cooling coil. 20

7. (a) What are various components of system heat gains ? 10
- (b) What points should be considered while making heat load calculation ? 10

Section-D

8. (a) Enumerate various methods of air-conditioning duct design and explain in detail. 10
- (b) What are the requirement of good room air-distribution ? 10

9. Write short notes on the following:

- (a) Thermostatic expansion valve 10
- (b) Evaporative condenser 10