Code No: **R1632033** **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, August-2021

REFRIGERATION AND AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
4. Use of refrigeration and air-conditioning tables and charts allowed.
5. Use of psychometric chart is allowed.

~~~~~~

PART –A **(14 Marks)**

1. a) Define Unit of refrigeration. [2M]
   b) What is the effect of super heating of vapor on the COP? [2M]
   c) Why global warming is increasing day-by-day? [2M]
   d) What are the refrigerant and absorbent in Li-Br and water absorption system? [3M]
   e) What do you understand by effective room sensible heat factor? [3M]
   f) List out the advantages and disadvantages of viscous filters over dry filters? [2M]

PART –B **(56 Marks)**

2. a) What are the factors to be considered for the refrigeration system for an aeroplane? Explain briefly. [4M]
   b) An air refrigerator working on the principle of Bell-Coleman cycle. The air into the compressor is at 1 atm at -10^0C. It is compressed to 10 atm and cooled to 40^0C at the same pressure. It is then expanded to 1 atm and discharged to take cooling load. The air circulation is 1 kg/s, the isentropic efficiency of the compressor = 80%, the isentropic efficiency of the expander = 90%. Find the following: [10M]
      i) Refrigeration capacity of the system;
      ii) C.O.P of the system, Take $\gamma = 1.4$, $C_p = 1.00$ kJ/kg ^{0}C.

3. A refrigeration system operates with R12 refrigerant. The evaporator and condenser temperature are at -5^0C and -35^0C respectively. The actual suction to the compressor is at 15^0C. If superheating of refrigerant vapour from -10^0C to 20^0C does not add any refrigerating effect: [14M]
      i) Determine the percentage increase in volume flow rate per ton of refrigeration compared with the saturation cycle;
      ii) Compare the COP for saturated and superheated cycles; and
      iii) Determine the power required per TR.

|''|''|||''|'''|||'|
~~~~~~

4. List the commonly used refrigerants in practice and explain in detail desirable chemical properties of refrigerants. [14M]

5. Explain the various components of steam jet refrigeration system and clearly discuss the function of each component. Compare the steam jet refrigeration system with vapor compression refrigeration system. [14M]

6. a) Which type of air cleaner would be selected for removing very small particles of dirt and smoke from the air? Explain the working principle of this cleaner. [7M]

   b) Explain in detail about heat pump circuits. [7M]

7. a) What is an effective temperature? State and explain the factors which govern optimum effective temperature. [7M]

   b) Atmospheric air having DBT=16^{0}C and RH=25% is passed through a furnace and then through a humidifier to maintain a final DBT of 30^{0}C and 50% R.H. Find the heat and moisture added to the air during the process. Also calculate the sensible heat factor of the process. [7M]

*****