

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.

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**PART -A**

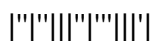
**(14 Marks)**

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  $-10^{\circ}\text{C}$ . It is compressed to 10 atm and cooled to  $40^{\circ}\text{C}$  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:  
i) Refrigeration capacity of the system;  
ii) C.O.P of the system, Take  $\gamma = 1.4$ ,  $C_p = 1.00 \text{ kJ/kg }^{\circ}\text{C}$ . [10M]
3. A refrigeration system operates with R12 refrigerant. The evaporator and condenser temperature are at  $-5^{\circ}\text{C}$  and  $-35^{\circ}\text{C}$  respectively. The actual suction to the compressor is at  $15^{\circ}\text{C}$ . If superheating of refrigerant vapour from  $-10^{\circ}\text{C}$  to  $20^{\circ}\text{C}$  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 [14M]  
desirable chemical properties of refrigerants.
5. Explain the various components of steam jet refrigeration system and [14M]  
clearly discuss the function of each component. Compare the steam jet  
refrigeration system with vapor compression refrigeration system.
6. a) Which type of air cleaner would be selected for removing very small [7M]  
particles of dirt and smoke from the air? Explain the working principle  
of this cleaner.  
b) Explain in detail about heat pump circuits. [7M]
7. a) What is an effective temperature? State and explain the factors which [7M]  
govern optimum effective temperature.  
b) Atmospheric air having DBT=16°C and RH=25% is passed through a [7M]  
furnace and then through a humidifier to maintain a final DBT of  
30°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.

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