

**5TH SEM /MECHANICAL/ MECH(MAIN)/ MECH(PROD)/ MECH(SAND) /
DIP IN MECH/ MECH(INDUSTRY INTEGRATION)/ 2022(W)**

TH-5 Refrigeration & Air Conditioning

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

PSYCHOMETRICS CHARTS ALLOWED

1. Answer **All** questions 2 x 10
 - a. What is sensible heat factor?
 - b. Discuss about closed system Brayton Cycle.
 - c. State the unit of refrigerating effect.
 - d. What is saturated air?
 - e. How does an air filter work?
 - f. Define refrigeration.
 - g. What is moist air?
 - h. What is humidity ratio?
 - i. What do you understand by human comfort?
 - j. Why a comfort chart is recommended?
2. Answer **Any Six** Questions 6 x 5
 - a. What do you mean by wet bulb temperature? Explain how it is different from dew point temperature.
 - b. Describe different components of a simple vapour compression refrigeration system.
 - c. Classify air-conditioning system.
 - d. Discuss in brief about the filters and fans used in air-conditioning system.
 - e. Air at 40°C has a relative humidity of 98%. What is dew point temperature? What mass of liquid water per kg of dry air will result if the moisture is cooled to 8°C at constant pressure of 85KPa.
 - f. State the factors considered while selection of a refrigerant for a system.
 - g. Differentiate between summer air-conditioning system and winter air-conditioning system
3. Explain briefly with a neat diagram the working of a practical vapour absorption system. 10
4. 1kg of air at a pressure of 1.2bar and a temperature of 18°C is compressed to 5.5bar. It is then cooled to 25°C in the cooler before entering the expansion cylinder. Assuming compression and expansion as isentropic processes, determine the refrigerating effect per kg of air and theoretical COP. Take $C_p = 1.0$ & $\gamma = 1.4$. 10
5. Describe in detail the summer air conditioning system with neat sketch. 10
6. How the load for air-conditioning is calculated? What are the factors which are to be considered while evaluating the heat gains? 10
7. A sling psychrometer recorded WBT and DBT as 22°C and 28°C. Calculate the Vapour Pressure, Degree of saturation, Relative humidity and Specific humidity. 10