Q.P. Code: 16ME325 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech IV Year I Semester Supplementary Examinations July-2022

REFRIGERATION & AIR CONDITIONING

(Common to AGE & ME)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	**a**	Define Unit of Refrigeration.	**5M**
	b	Explain the working of a Reversed Carnot cycle of refrigeration with P-V and T-S Diagrams.	**7M**

OR

2		A refrigerator working on Bell Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10 ° C, compressed and then it is cooled to 30 ° C before entering the expansion cylinder. The expansion and compression follows the law $PV^{1.3}$= constant. Determine the theoretical C.O.P of the system.	**12M**

UNIT-II

3	**a**	State the functions of expansion device.	**6M**
	b	Construct Pressure – Enthalpy (p-h) chart of Vapor compression cycle	**6M**

OR

4		Sketch and explain a two-stage cascade refrigeration system.	**12M**

UNIT-III

5	**a**	Advantages of vapour absorption refrigeration system over vapour compression refrigeration system.	**6M**
	b	Define the terms nozzle efficiency and entrainment efficiency in steam jet refrigeration system.	**6M**

OR

6		Describe the working of Vortex tube with a neat sketch and its merits and demerits	**12M**

UNIT-IV

7		A room 7m × 4m× 4m is occupied by an air-water vapour mixture at 380C. The atmospheric pressure is 1 bar and the relative humidity is70%. Determine the humidity ratio, dew point, mass of dry air and mass of water vapour. If the mixture of air-water vapour is further cooled at constant pressure until the temperature is 100C. Find the amount of water vapour condensed.	**12M**

OR

8		Define the following terms (i)Infiltration (ii)Natural ventilation (iii)Forced ventilation	**12M**

UNIT-V

9		An air conditioning plant is required to supply 60 m^3 of air per minute ata DBT of 21°C and 55 % RH. The outside air is at DBT of 28 ° C and 60% RH. Determine the mass of water drained and capacity of the cooling coil. Assume the air conditioning plant first to dehumidify and then to cool the air. Take W_1=0.0142, W_2=0.0084 kj /kg of dry air, V_{s2}=0.845 m^3 / kg, h_1=64.8 kj/kg, h_2=42.4 kj/kg.	**12M**

OR

10 Following data refers to an air conditioning system to be designed for an industrial process for hot and wet climate. Outside conditions 30 ° C DBT and 75 % RH, Inside conditions 20 ° C DBT and 60 % RH. **12M**

The require condition is to be achieved first by cooling and dehumidifying and then by heating. If 20 m^3 of air is absorbed by the plant every minute. Find (i) Capacity of the cooling coil in tonnes of refrigeration (ii) Capacity of the heating coil in KW (iii) Amount of water removed per hour. Take h_1=81.8 kj/kg, h_2=34.2 kj/kg, h3=42.6 kj/kg,W_1=0.0202 kj/kg, W_2=0.0088 kj/kg, V_{s1}=0.886 m^3/kg

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