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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations December-2021

REFRIGERATION & AIR CONDITIONING

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

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|---|--------------------------------------------|----|----|
| 1 | a Define Refrigeration | L1 | 2M |
| | b Explain the function of expansion valve. | L1 | 2M |
| | c State PELTIER EFFECT | L1 | 2M |
| | d Define Specific humidity | L1 | 2M |
| | e Differentiate DBT & WBT | L1 | 2M |

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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|---|----------------------------------------------------------------------------|----|----|
| 2 | a Define C.O.P. | L1 | 3M |
| | b With neat sketch Explain the working of Simple air refrigeration system. | L1 | 7M |

OR

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|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 3 | In a refrigeration plant working on Bell Coleman cycle, air is compressed to 5 bar from 1 bar. Its initial temperature is 10 ° C. After compression, the air is cooled up to 20 ° C in a cooler before expanding to a pressure of 1 bar. Determine the theoretical C.O.P of the plant and net refrigerating effect. Take $C_p = 1.005 \text{ KJ/Kg K}$ and $C_v = 0.718 \text{ KJ/Kg K}$ | L5 | 10M |
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UNIT-II

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| 4 | a What are the advantages of vapour compression refrigeration system over air refrigeration system? | L2 | 5M |
| | b With a neat sketch, explain the working principle of vapour compression refrigeration system. | L6 | 5M |

OR

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| 5 | Sketch and explain a two-stage cascade refrigeration system. | L1 | 10M |
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UNIT-III

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| 6 | a Advantages of vapour absorption refrigeration system over vapour compression refrigeration system. | L6 | 5M |
| | b State the advantages and limitations of VAR. | L1 | 5M |

OR

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| 7 | Explain with a neat sketch the working of lithium-bromide vapour absorption system | L5 | 10M |
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UNIT-IV

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| 8 | a With the help of psychometric chart, Explain the Heating and dehumidification processes. | L5 | 5M |
| | b Define saturated air, degree of saturation. | L1 | 5M |

OR

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| 9 | Explain the procedure to draw a grand sensible heat factor line on a psychometric chart. | L5 | 10M |
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UNIT-V

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|----|------------------------------------------------------------|----|----|
| 10 | a Define the terms static and velocity pressure in a duct. | L1 | 5M |
| | b Derive an expression for continuity equation in ducts. | L1 | 5M |

OR

- 11 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. 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 $h_1=81.8\text{ kJ/kg}$, $h_2=34.2\text{ kJ/kg}$, $h_3=42.6\text{ kJ/kg}$, $W_1=0.0202\text{ kJ/kg}$, $W_2=0.0088\text{ kJ/kg}$, $V_{s1}=0.886\text{ m}^3/\text{kg}$

END