B.E. (Mechanical Engineering) Eighth Semester
Energy Conversion - III (Old)

P. Pages : 2

Time : Three Hours

TKN/KS/16/2429

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Answer **three** questions from section A and **three** questions from section B.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use of Steam tables, Mollier's chart, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
7. Use of non-programmable calculator is permitted.

SECTION – A

1. a) Discuss the effect of the following on the performance of a vapour compression system. **4**

b) A refrigeration machine is required to produce ice at 0ºC from water at 20ºC. The machine **10** has a condenser temperature of 298k while the evaporator temperature is 268k. The relative efficiency of the machine is 50% and 6 kg of freon - 12 refrigerant is circulated through the system per minute. The refrigerant enters the compressor with a dryness fraction of 0.6. Specific heat of water is 4.187 kJ/kg.k and the latent heat of ice is 335 kJ/kg. Calculate the amount of ice produced in 24 hours the table of properties of freon – 12 is given below.

Temperature (k)	Liquid heat kJ/kg	Latent heat kJ/kg	Entropy of liquid (kJ/kg·k)
298	59.7	138.0	0.2232
268	31.4	154.0	0.1251

2. a) Sketch and explain in brief the working of simple vapour absorption refrigeration system and give the advantages over simple vapour compression system. **7**

b) Sketch and explain Linde. Hampson system with the help of T-s diagram. **6**

3. a) Define : **4**

i) Degree of saturation   ii) Dew point temperature

iii) Relative Humidity   iv) Absolute humidity

b) The sling psychrometer in a laboratory test recorded the following readings **9**
     Dry bulb temperature = 35ºC
     Wet bulb temperature = 25ºC
Calculate the following.

i) Specific humidity   ii) Relative humidity

iii) Vapour density in air   iv) Dew point temperature

v) Enthalpy of mixture per kg of dry air
Take atmospheric pressure = 1.0132 bar

4.	a)	Explain the working of air washer with neat sketch.	**5**
	b)	Describe year round air conditioning with neat sketch.	**5**
	c)	Explain in brief evaporative cooling as applied to a desert cooler. Sketch the process on psychometric chart.	**3**
5.	a)	Write short note on following **any three.**	**13**

        i)   Solar pond

        ii)   Solar furnace

        iii) Pressurised solar water heating system.

        iv) Solar green house

        v)   Solar Dryer

SECTION – B

6.	a)	Describe with neat sketch working of open cycle MHD generator.	**7**
	b)	Classify the solar collectors in detail and explain any one of them with neat sketch.	**6**
7.	a)	List out various types of pressure control used in hydraulic circuit and explain in brief pressure relief valve with neat sketch.	**6**
	b)	Explain with neat sketch working of sequencing hydraulic circuit.	**7**
8.	a)	Explain in detail various neutrals used in 4/3 Direction control valve.	**6**
	b)	Explain with neat sketch working of regenerative hydraulic ckt.	**7**
9.	a)	What is FRL unit? Explain different components of FRL unit in brief.	**7**
	b)	Draw the pneumatic circuit showing the meter in flow control in both the direction of a double acting actuator.	**6**
10.	a)	Explain the following **any two.**	**6**

        i)   Energy conservation measures.

        ii)   Payback period.

        iii) Sankey diagram.

	b)	Discuss the need and importance of energy conservation and give energy conservation tips for any thermal utility.	**8**

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