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

Question Paper Code: 53703

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Third Semester

Mechanical Engineering

15UME303 - ENGINEERING THERMODYNAMICS

(Regulation 2015)

(Steam table Mollier chart and Psychrometric chart Permitted)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Which of the following is an intensive property of a thermodynamic system CO1- R

   (a) Volume (b) Temperature (c) Mass (d) Energy

2. The absolute zero temperature is taken as CO1- R

   (a) -273^0C (b) 273 K (c) 237^0 C (d) -237 K

3 Carnot cycle has maximum efficiency CO2- R

   (a) Petrol engine (b) Diesel engine (c) Reversible engine (d) Irreversible engine

4. The increase in entropy of a system represent CO2- R

   (a) Increase in availability of energy (c) Decrease in temperature

   (b) Increase in temperature (d) Degradation of energy

5. Cycle used in thermal power plants is CO3- R

   (a) Carnot cycle (b) Reversed Carnot cycle (c) Rankine cycle (d) Brayton cycle

6. Dryness fraction of dry steam is CO3- R

   (a) 0 (b) 1 (c) 2 (d) 3

7. Following relationship defines the Gibb's free energy G CO4- R

   (a) G=H+TS (b) G=H-TS (c) G=U+TS (d) G=U+PV

8. Internal energy and enthalpy of an idle gas are function of CO4- R

   (a) Temperature only (b) Pressure only

   (c) Temperature and pressure (d) Pressure, temperature and specific volume

9. During sensible cooling, CO5- R

(a) Relative humidity remains constant

(b) Wet bulb temperature increases

(c) Specific humidity remains constant

(d) Partial pressure of water vapour remains constant

10. The difference between dry bulb temperature and dew point temperature is called CO5- R

(a) Dry bulb temperature (b) Wet bulb temparature

(c) Dew point depression (d) Wet bulb depression

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. 5 kg of air at 40^{o}C and 1 bar is heated in a reversible non flow constant pressure process until the volume is doubled. Find CO1- App (8)

(i) Charge in volume

(ii) Work done

(iii) Change in internal energy

(iv) Change in enthalpy

12. Two Carnot engine A and B are operated in series. The first one A receives heat at 870 k and rejects to a reservoir at temperature T. The second engine B receives the heat rejected by the first engine and in turn rejects to a heat reservoir at 300k.Calculate the temperature T in ^{0}C for the following cases: CO2- App (8)

(i) The work output of the two engines are equal

(ii) The efficiencies of the two engines are equal.

13. A cylinder contains 150 liters of steam at 400 Kpa and 0.5 dry. The steam is compressed hyperbolically to 0.06 m^3. Find: mass of vapour, the final dryness fraction and the heat transferred. CO3- Ana (8)

14. A mixture of ideal gases consists of 2.5 kg of N_2 and 4.5 kg of CO_2 at a pressure of 4 bar and a temperature of 25^0C. Determine (i) Mole fraction of each constituent CO4- U (8)

(ii) Equivalent molecular weight of the mixture

(iii) Equivalent gas constant of the mixture

(iv) The partial pressure and partial volume

(v) The volume and density of the mixture.

15. Atmospheric air at a dry bulb temperature of 16^0C and 25 % RH passes through a furnace and then through a humidifier, in such a way that the final dry bulb temperature is 30^0C and 50% RH. Find the heat and moisture added to the air. CO5- U (8)