Q.P. Code: 19ME0305 **R19**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations February-2022

ENGINEERING THERMODYNAMICS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Define the following i)Enthalpy ii) Internal Energy	**L1**	**6M**
	b	What do you understand by path function and point function?	**L2**	**3M**
	c	What are the exact and inexact differentials?	**L2**	**3M**

OR

2	**a**	List the difference between a closed system and an open system	**L4**	**6M**
	b	Describe thermodynamic control volume.	**L1**	**6M**

UNIT-II

3	**a**	A tank containing air is stirred by a paddle wheel. The work input to the paddle wheel is 9000 kJ and the heat transferred to the surroundings from the tank is 3000 kJ.Determine : (i) Work done ; (ii) Change in internal energy of the system.	**L5**	**6M**
	b	Define first law of thermodynamics. Justify that internal energy is a property of the system.	**L1**	**6M**

OR

4	**a**	Define Statements of second law of thermodynamics i) Clausius statement ii) Kelvin-plank statement	**L1**	**6M**
	b	10 kg of fluid per minute goes through a reversible steady flow process. The properties of fluid at the inlet are : P1 = 1.5 bar, ρ1 = 26 kg/m3, [CO1] = 110 m/s and u1 = 910 kJ/kg and at the exit are P2 = 5.5 bar, ρ2 = 5.5 kg/m3, [CO2] = 190 m/s and u2 = 710 kJ/kg. During the passage, the fluid rejects 55 kJ/s and rises through 55 metres. Determine : (i) The change in enthalpy (Δ h) ; (ii) Work done during the process (W).	**L5**	**6M**

UNIT-III

5	**a**	How the partial pressure in gas mixture related to mole fraction?	**L4**	**6M**
	b	Derive the equation for work done in a reversible adiabatic process.	**L1**	**6M**

OR

6	**a**	What is a polytropic process?	**L1**	**4M**
	b	A cylinder contains 0.45 m3 of a gas at 1 × 105 N/m2 and 80°C. The gas is compressed to a volume of 0.13 m3, the final pressure being 5 × 105 N/m2. Determine : (i) The mass of gas ; (ii) The value of index 'n' for compression ; (iii) The increase in internal energy of the gas ; (iv) The heat received or rejected by the gas during compression. Take ɣ = 1.4, R = 294.2 J/kg°C	**L5**	**8M**

UNIT-IV

7		Develop the expression for air standard efficiency, work done of an Otto cycle.	L3	12M

OR

8	a	Write a short note on dryness fraction.	L1	6M
	b	Find the saturation temperature change in specific volume and entropy during evaporation and latent heat of vaporization of steam at 1Mpa 3800C.	L1	6M

UNIT-V

9	a	Compare Rankine cycle with Carnot cycle.	L4	6M
	b	What will be the effect of operating conditions on Rankine cycle efficiency?	L1	6M

OR

10		A steam turbine is fed with steam having an enthalpy of 3100 kJ/kg. It moves out of the turbine with an enthalpy of 2100 kJ/kg. Feed heating is done at a pressure of 3.2 bar with steam enthalpy of 2500 kJ/kg. The condensate from a condenser with an enthalpy of 125 kJ/kg enters into the feed heater. The quantity of bled steam is 11200 kg/h. Find the power developed by the turbine. Assume that the water leaving the feed heater is saturated liquid at 3.2 bar and the heater is direct mixing type. Neglect pump work.	L5	12M

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