O.P.Code: 16ME307	R16	H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Supplementary Examinations May/June-2024
ENGINEERING THERMODYNAMICS
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 60**

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

UNIT-I

1	a	What is meant by property of a substance? Distinguish between intensive property and extensive property.	CO1	L1	6M
	b	State the differences between a closed system and an open system.	CO1	L2	6M
		OR			
2		Compare and contrast between heat and work.	CO1	L3	12M

UNIT-II

3	a	State the First Law of Thermodynamics. Prove that the internal energy is a property of a system.	CO2	L1	6M
	b	A steam turbine operates under steady flow conditions. Steam with an enthalpy of 2786 kJ/kg enters the turbine and leaves with an enthalpy of 2513 kJ/kg. Heat is lost to the surroundings at the rate of 5.30 kJ/sec. If the rate of steam flowing though the turbine is 0.40 kg/sec, find the power output of the turbine.	CO2	L2	6M
		OR			
4	a	Describe the different modes through which energy is stored in a system.	CO2	L2	6M
	b	A system operates on a thermodynamic cycle having four processes. The heat transfers during the four processes are Q_1 = 60 kJ, Q_2 = -40 kJ, Q_3= 15 kJ, and Q_4=-20 kJ. Calculate the net work done by the system.	CO2	L2	6M

UNIT-III

5	a	Discuss the limitations of First Law of Thermodyanamics.	CO3	L2	6M
	b	State and explain Second Law of Thermodynamics.	CO3	L2	6M
		OR			
6	a	State the equivalence of Clausius and Kelvin statement of Second Law.	CO3	L1	6M
	b	An inventor claims to have developed an heat engine that takes in 105 MJ at a temperature of 400 K, rejects 42 MJ at a temperature of 200 K, and delivers 15 kWh of mechanical work. Prove he is incorrect.	CO3	L2	6M

UNIT-IV

7	a	Recall Van der Walls equation of state. How does it differ from the ideal gas equation of state.	CO4	L1	6M
	b	Describe Dalton's law of partial pressures.	CO4	L2	6M
		OR			
8		A mass of 0.25 kg of an ideal gas has a pressure of 300 kPa, at a temperature of 80 °C and a volume of 0.07 m^3. The gas undergoes an irreversible adiabatic process to final pressure of 300 kPa and final volume of 0.1 m^3, during which the work done on the gas is 25 kJ. Find Cp, Cv of the gas and the increase in the gas entropy.	CO4	L2	12M

UNIT-V

9	a	Draw p-v diagram and T-S diagram for Otto cycle.	CO5	L1	6M
	b	What is Joule-Thompson coefficient and why is it zero for ideal gas?	CO5	L1	6M
		OR			
10		Draw p-v diagram and T-S diagram for Diesel cycle. Derive the equation for thermal efficiency of the cycle.	CO5	L1	12M

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