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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations July-2021

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 terms i) System ii) Boundary iii) Surroundings	L1	**6M**
	b	What do mean by property? Distinguish between intensive and extensive property.	L1	**6M**
		OR		
2	**a**	List the difference between a closed system and an open system	L4	**6M**
	b	Compare the cyclic process and non-cyclic process.	L1	**6M**
		UNIT-II		
3	**a**	In an internal combustion engine, during the compression stroke the heat rejected to the cooling water is 50 kJ/kg and the work input is 100 kJ/kg. Calculate the change in internal energy of the working fluid stating whether it is a gain or loss.	L5	**6M**
	b	Define first law of thermodynamics. Justify that internal energy is a property of the system.	L1	**6M**
		OR		
4	**a**	In an air motor cylinder the compressed air has an internal energy of 450 kJ/kg at the beginning of the expansion and an internal energy of 220 kJ/kg after expansion. If the work done by the air during the expansion is 120 kJ/kg, calculate the heat flow to and from the cylinder.	L3	**6M**
	b	What is Steady Flow Process? Derive Steady Flow Energy Equation (SFEE) for an open system.	L3	**6M**
		UNIT-III		
5	**a**	State and Explain Dalton law of partial pressure.	L2	**6M**
	b	Develop the expression of work transfer for an ideal gas in reversible isothermal process.	L3	**6M**
		OR		
6		An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine : (i) Change in internal energy, (ii) Work done, (iii) Heat transferred, and (iv) Change in entropy. Take for nitrogen : c_p = 1.04 kJ/kg K, and c_v = 0.7432 kJ/kg K.	L5	**12M**

UNIT-IV

7	a	Develop an expression for Carnot Cycle and efficiency of cycle.	L3	6M
	b	A carnot engine working between 400° C and 40° C produce 130 KJ of work. Determine i) The thermal efficiency. ii) the heat added iii) The entropy changes during the heat rejection process.	L3	6M

OR

8		Differentiate between Otto cycle, diesel cycle and dual combustion cycle.	L4	12M

UNIT-V

9		Describe Simple steam power cycle with neat sketches.	L1	12M

OR

10		A steam power plant operates on a theoretical reheat cycle. Steam from boiler at 150 bar, 550°C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550°C and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-s and h-s diagrams. Find : (i) Quality of steam at turbine exhaust ; (ii) Cycle efficiency ; (iii) Steam rate in kg/kWh.	L5	12M

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