Q.P. Code: 16ME307 **R16**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations Dec 2019

ENGINEERING THERMODYNAMICS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	a	Show that heat and work is a path function and not a property of the system?	**6M**
	b	State the following b i) Pressure ii) Temperature iii) volume iv) Density	**6M**

OR

2	a	What is meant by thermodynamics equilibrium? Explains its types briefly.	**6M**
	b	State the differences between heat and work.	**6M**

UNIT-II

3	a	State first law of thermodynamics. Prove that internal energy is a property of the system.	**4M**
	b	The air in a system expands from a temperature of 600C to 3000C at a constant pressure of 2 bars. Calculate the heat transfer, work done and change in internal energy. The mass of the air is 0.6 Kg. Assume Cp=1.02 KJ/KgK and Cv= 0.71 KJ/KgK for air.	**8M**

OR

4	a	What are the different modes in which energy is stored in a system?	**5M**
	b	During a cycle consisting of four processes, the heat transfer are a s following. Q1 = +60KJ, Q2 = -40KJ, Q3= 15KJ, and Q4=-20KJ, Determine the net work done by the system.	**7M**

UNIT-III

5	a	State and explain second law of thermodynamics.	**4M**
	b	An adiabatic vessel contain 2 kg of water at 25 0C. By peddle wheel work transfer the temperature of water is increase to 30 0C. If the specific heat of water is assumed constant at 4.187 kJ/kgK, Find entropy change of universe.	**8M**

OR

6	a	Show the equivalence of Clausius and Kelvin statement of second law.	**7M**
	b	Calculate the decrease in energy when 25 kg of water at 95 0C mix with 35 kg of water at 35 0C, the pressure being taken as constant and temperature of the surrounding being 15 0C (cp of water = 4.2 kJ/kg K).	**5M**

UNIT-IV

7	a	What is Avogadro's law?	**7M**
	b	Air in a closed stationary system expands in a reversible adiabatic process from 0.5 MPa, 15°C to 0.2 MPa. Find the final temperature, and per kg of air,the change in enthalpy, the heat transferred, and the work done.	**5M**

OR

8	a	State Dalton's law of partial pressures.	4M
	b	Air contained in a cylinder fitted with a piston is compressed reversibly according to the law pv1.25 = const. The mass of air in the cylinder is 0.1 kg. The initial pressure is 100 kPa and the initial temperature 20°C. The final volume is 1/ 8 of the initial volume. Determine the work and the heat transfer.	8M

UNIT-V

9	a	Derive the Maxwell's equations.	5M
	b	In an air standard diesel cycle, the compression ratio is 16, and at the begging of isentropic compression, the temperature is 15 0C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of constant pressure process is 1480 0C. Calculate (a) The Cut-off ratio (b) The heat supplied per kg of air(c) The cycle efficiency (d) the mean effective pressure.	7M

OR

10	a	Derive an expression for thermal efficiency & mean effective pressure of a dual combustion cycle by drawing PV and TS diagrams.	6M
	b	An Air Standard Dual cycle has a compression ratio of 16, and the compression begins at 1 bar, 500C.The maximum pressure is 70 bar, the heat transferred to air at constant pressure is equal to that at constant volume. Estimate (a)The pressure and temperature at the cardinal points of the cycle(b) The cycle efficiency (c) the mean effective pressure (for air Cp=1.005kj/kg. k , Cv = 0.717 kJ/kgk, and R=0.287 kJ/kgk)	6M

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