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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations May-2022

BASIC THERMODYNAMICS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1		Explain the following		
	a	Enthalpy	**L2**	**3M**
	b	Internal Energy	**L2**	**3M**
	c	Specific heat	**L2**	**3M**
	d	Thermodynamic cycle	**L2**	**3M**
		OR		
2		What is meant by thermodynamics equilibrium? Explains its types briefly.	**L1**	**12M**
		UNIT-II		
3		State the concept of entropy of gas and availability and unavailability	**L1**	**12M**
		OR		
4	**a**	The air in a system expands from a temperature of 60°C to 300°C 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.	**L3**	**8M**
	b	State second law of thermodynamics	**L1**	**4M**
		UNIT-III		
5	**a**	Sketch the following processes on P-V and T-S diagrams (i) constant volume (ii) constant pressure (iii) constant temperature (iv) isentropic process	**L2**	**4 M**
	b	In a closed vessel a certain quantity of gas is heated from 200 KN/m^2 to 500 KN/m^2. If the volume of the vessel is 5000 litres find the quantity of i) heat transfer ii) change in internal energy iii) work done.cp= 1.005 KJ/kgk and cv =0,715 KJ/kgk	**L3**	**8M**
		OR		
6	**a**	Derive an expression for work done during isothermal process.	**L3**	**6M**
	b	0.2 kg of air at pressure of 1.1 bars and 15°c is compressed isothermally to a pressure of 5.5 bars. Calculate (i) final volume (ii) heat rejected (iii) change in internal energy. Assume R= 0.292 KJ/KgK.	**L3**	**6M**
		UNIT-IV		
7	**a**	An engine working on the Otto cycle is supplied with air at 0.1 MPa ,35°C .the compression ratio is 8.the heat supplied is 2100 kJ/kg .calculate the Maximum pressure and temperature of the cycle ,the cycle efficiency and the mean effective pressure.(for air Cp=1.005kj/kg. k , Cv = 0.717 kJ/kgk, and R=0.287 kJ/kgk).	**L3**	**12 M**

OR

8	a	Derive an expression for the thermal efficiency of Ericson cycle and draw P-V & T-S diagrams.	L2	6M
	b	An oil engine working on the dual combustion cycle has a compression ratio 14 and the explosion ratio obtained from an indicator card is 1.4. If the cut-off occurs at 6 per cent of stroke, find the ideal efficiency. Take γ for air = 1.4.	L3	6M

UNIT-V

9	a	Explain with the help of neat diagram about Regenerative Cycle.	L2	6M
	b	In a regenerative cycle inlet conditions are 40 bar and 400°C. Steam is bled at 10bar in regenerative heating. The exit pressure is 0.8 bar. Neglecting the pump work. Determine the efficiency of the cycle.	L3	6M

OR

10		A steam power plant operates on a theoretical reheat cycle. Steam at 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	L3	12M

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