O.P.Code: 16ME312	R16	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations June-2024

THERMAL ENGINEERING

(Mechanical Engineering)

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

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

UNIT-I

1	a	Draw Theoretical and actual port timing diagrams of a 2 stroke petrol engine	CO1	L1	6M
	b	Describe in detail about the factors effecting the knocking	CO1	L2	6M
		OR			
2	a	A single cylinder and stroke cycle I.C. engine when tested, the following observations available :Area of indicator diagram = 3 sq.cm, Length of indicator diagram = 4 cm, Spring constant = 10 bar/cm, Speed of engine = 400 rpm, Brake drum diameter = 120 cm, Dead weight on brake = 380 N, Spring balance reading = 50 N, Fuel consumption = 2.8 kg/hr., Cv = 42000 kJ/kg, Cylinder diameter = 16 cm, Piston stroke = 20 cm. Find : (i) F.P (ii) Mechanical efficiency (iii) BSFC and (iv) Brake thermal efficiency	CO1	L3	6M

UNIT-II

3	a	With the help of neat sketch explain the working principle of multi stage reciprocating air compressor with effect of intercooler.	CO2	L2	6M
	b	Derive the relation for work done on single stage reciprocating compressor without clearance	CO2	L3	6M
		OR			
4		A single –stage double –acting air compressor is required to deliver 14 m3 of air per Minute measured at 1.013 bar and 1500C. The delivery pressure is 7 bar and the speed 300 r.p.m. Take the clearance volume as 5% of the swept volume with the compression and expansion index of 1.3 Calculate: (i). Swept volume of the cylinder; (ii). The delivery temperature; (iii). Indicated power.	CO2	L3	6M

UNIT-III

5	a	State the methods of increasing the thermal efficiency of Rankine cycle.	CO3	L1	6M
	b	In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar and the exhaust pressure is 0.2 bar. Determine. (i) The pump work, (ii) Turbine work, (iii) Rankine efficiency, (iv) Condenser heat flow, Assume flow rate of 12kg/s.	CO3	L3	6M
		OR			
6		Steam at a pressure of 15 bar and 250oC is expanded through a turbine at first to a pressure of 4 bar. It is then reheated at constant pressure to the initial temperature of 250oC and is finally expanded to 0.1 bar. Using mollier chart, estimate the work done per kg of steam and amount of heat supplied.	CO3	L3	6M

UNIT-IV

7		Dry saturated steam enters a steam nozzle at a pressure of 15 bar and is discharged at a pressure of 2 bar. If the dryness fraction of discharge steam is 0.96, what will be final velocity of steam?	CO4	L3	6M
		OR			

8		Explain about jet condenser and various types of jet condenser with neat sketches	CO4	L2	6M

UNIT-V

9	a	Draw and explain the velocity triangle of impulse turbine.	CO5	L2	8M
	b	Derive an expression for work done in impulse turbine.	CO5	L3	4M

OR

10		In a single stage reaction turbine, both the fixed and moving blades have the same tip angles of 35° and 20° for inlet and outlet respectively. Determine the power required if the isentropic heat drop in both fixed and moving rows is 23.5 kJ/kg. The mean blade speed is 80 m/s and the steam consumption is 22,500 kg/hr.	CO5	L3	12M

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