Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Supplementary Examinations August-2021
THERMAL ENGINEERING
(Mechanical Engineering)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 60

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1	a	How are heat engine classified	**2M**
	b	Mention single stage compressor equation for work, if neglecting clearance volume.	**2M**
	c	What is Saturation temperature	**2M**
	d	Classify the types of condenser and list it.	**2M**
	e	What are the methods of steam turbine governing?	**2M**

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Explain the working of 4-stroke Diesel engine.	**5M**
	b	Show the theoretical and actual valve-timing diagram for Diesel engine.	**5M**

OR

3 Following observations were recorded during a test on a single cylinder oil engine: **10M**
Bore = 300 mm, Stroke = 450 mm, Speed = 300 rpm, i.m.e.p.= 6 bar, net brake load = 1.5 kN, brake drum diameter = 1.8 m, brake rope diameter = 2 cm. Calculate:
i) Indicate power, ii) Brake power, iii)Mechanical efficiency.

UNIT-II

4	a	Explain the working principle of single stage single acting reciprocating air compressor.	**5M**
	b	Construct the expression for work done single stroke single acting reciprocating compressor.	**5M**

OR

5 A single-stage double-acting air compressor is required to deliver 14 m of air per **10M**
minute measured at1.013 bar and 15°C. 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 n =1.3. Calculate : (i) Swept volume of the cylinder ;
(iii) Indicated power.

UNIT-III

6	a	The adiabatic enthalpy drop across the prime mover of the Rankine cycle is 540 kg. The enthalpy of steam supplied is 2940 kJ/kg. If the backpressure is 0.1 bar, find the specific steam consumption and thermal efficiency.	**5M**
	b	Construct the expression for efficiency of Rankine cycle	**5M**

OR

7 Steam at a pressure of 15 bar and 250oC is expanded through a turbine at first to a **10M**
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.

UNIT-IV

8 Steam initially dry and saturated is expanded in a nozzle from 15 bar at 300oC to 1.0 bar. If the frictional loss in the nozzle is 12% of the total heat drop calculate the mass of steam discharged when exit diameter of the nozzle is 15 mm. **10M**

OR

9 Express about jet condenser and various types of jet condenser with neat sketches. **10M**

UNIT-V

10 The velocity of steam exiting the nozzle of the impulse stage of a turbine is 400 m/s. The blades operate close to the maximum blading efficiency. The nozzle angle is 20%. Considering equiangular blades and neglecting blade friction, calculate for a steam flow 0.6. kg/s, the diagram power and the diagram efficiency. **10M**

OR

11 Explain about the various methods of Governing steam turbines with neat sketches. **10M**

END