Q.P. Code: 18ME0315 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Regular Examinations Feb-2021

THERMAL ENGINEERING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

PART-A

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

1	a	What are the important basic components of an IC engines?	**2M**
	b	Enumerate the application of compressed air.	**2M**
	c	Describe term Sensible heat.	**2M**
	d	Recall term a steam condenser.	**2M**
	e	Define a steam turbine and its fields of application.	**2M**

PART-B

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

UNIT-I

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

OR

3		A single cylinder 4 stroke diesel engine gave the following results while running on full load: Area of indicator card = 300 mm^2, Length of diagram = 40 mm, Spring constant = 1 bar/mm, Speed of the engine = 400 rpm, Load on the brake = 370 N, Spring balance reading = 50 N, Diameter of brake drum = 1.2 m, Fuel consumption = 2.8 kg/hr, Calorific value of fuel = 41800 kJ/kg, Diameter of the cylinder = 160 mm, Stroke of the piston = 200 mm. Calculate: i)Indicate mean effective pressure, ii)Brake power and brake mean effective pressure, iii) Brake specific fuel consumption, brake thermal and indicated thermal efficiencies.	**10M**

UNIT-II

4		Construct an expression for minimum work for two stage reciprocating air compressors.	**10M**

OR

5		An air compressor takes in air 1 bar and 20 ^{o}C and compresses it according to law to $pV^{1.25}$ = constant. It is then delivered to a receiver at a constant pressure of 10 bar. R= 0.287 kJ/kg K. Determine: i). Temperature at the end of compression, ii) Work done, iii) Heat transferred during compression per kg of air.	**10M**

UNIT-III

6	a	List out the methods of increasing the thermal efficiency of Rankine cycle.	**4M**
	b	A simple Rankine cycle works between pressures 28 bar and 0.06 bar, the initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption.	**6M**

OR

7 A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 550oC, 150 bar expands through the high-pressure turbine. It is reheated at a constant pressure of 40 bar to 550oC 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/ Kw-hr. **10M**

UNIT-IV

8 **a** Explain various types of nozzles with neat sketches. **6M**

b What are the effects of friction on flow through nozzle? **4M**

OR

9 Explain about Surface condenser and discuss its types with neat sketches. **10M**

UNIT-V

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. **10M**

OR

11 **a** Distinguish between impulse and reaction turbines. **5M**

b List out the various losses in steam turbines? Explain them Briefly. **5M**

END