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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations December-2021

THERMAL ENGINEERING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

PART-A

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

1	a	Give example of EC and IC engines	L3	2M
	b	Enumerate the application of compressed air	L1	2M
	c	Recall meaning of Enthalpy of steam	L1	2M
	d	Classify the various types of nozzles.	L2	2M
	e	Compare the throttle and Nozzle control governing	L5	2M

PART-B

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

UNIT-I

2	a	Explain any six classifications of Internal Combustion engines.	L2	5M
	b	With a neat sketch, explain any three parts in Internal Combustion engine.	L2	5M

OR

3	a	A two-stroke cycle internal combustion engine has a mean effective pressure of 6 bars. The speed of the engine is 1000 rpm. If the diameter of piston and stroke are 110 mm and 140 mm respectively, find the indicated power developed.	L4	5M
	b	A single cylinder, four stroke cycle oil engine is fitted with a rope brake.The diameter of the brake wheel is 600 mm and the rope diameter is 26 mm. The dead load on the brake is 200 N and the spring balance reads 30 N. If the engine runs at 450 rpm, Discover the brake power of the engine.	L4	5M

UNIT-II

4	a	Explain the working principle of single stage single acting reciprocating air compressor.	L2	5M
	b	Construct the expression for work done single stroke single acting reciprocating compressor.	L3	5M

OR

5		An air compressor takes in air 1 bar and 20 oC and compresses it according to law to pV1.25 = 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.	L4	10M

UNIT-III

6	a	List out the methods of increasing the thermal efficiency of Ranking cycle.	L1	5M
	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.	L4	5M

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.	L4	10M

UNIT-IV

8	Define Steam nozzle and explain about expansion of steam in nozzle with neat sketch.	L2	10M

OR

9	Steam initially dry and saturated is expanded in a nozzle from 15 bars 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.	L4	10M

UNIT-V

10	**a**	Explain the working process of impulse turbine	L2	5M
	b	Show the velocity triangle diagram of impulse turbine.	L2	5M

OR

11	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.	L4	10M

END