

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

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

UNIT-I

- 1 A four stroke four-cylinder diesel engine running at 300 rpm produces 25 kW of brake power. The cylinder dimensions are 30 cm bore and 25 cm stroke. Fuel consumption rate is 1 kg/min while air fuel ratio is 10. The average indicated mean effective pressure is 0.8 MPa. Determine indicated power, mechanical efficiency, and brake thermal efficiency of engine. The calorific value of fuel is 43 MJ/kg. The ambient conditions are 1.013 bar, 27°C. 12M

OR

- 2 a Explain the phenomenon of knocking in SI engines? 6M
b What are the important basic components of an internal combustion engines? Explain them briefly 6M

UNIT-II

- 3 a With the help of neat sketch explain the working principle of single stage reciprocating air compressor? 6M
b A single stage single acting air compressor has an effective swept volume of 5m³/min and delivers to a receiver pressure of 6.5 bar. The index of compression is 1.25. Calculate work done? 6M

OR

- 4 a With the help of neat sketch, explain the working of vane type compressor 5M
b Derive an expression for minimum work for two single stage reciprocating air compressors? 7M

UNIT-III

- 5 a A steam power plant works between 40 bar and 0.05 bar. If the steam supplied is dry saturated and the cycle of operation is Rankine, Find: (i) Cycle efficiency, (ii) Specific steam consumption 6M
b State the methods for increasing the thermal efficiency of Rankine cycle? 6M

OR

- 6 A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 550° C, 150 bar 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/ Kw-hr. 12M

UNIT-IV

- 7 a Explain various types of nozzles with neat sketches? 6M
b Derive an expression for velocity of steam at exit of nozzle? 6M

OR

- 8 Explain about Surface condenser and discuss its types with neat sketches? 12M

UNIT-V

- 9 Draw the combined velocity triangle of Impulse turbine and explain its salient features? 12M

OR

- 10 In a De-laval turbine, the steam enters the wheel through a nozzle with a velocity of 350m/s at an angle of 20° to direction of motion of the blade. The blade speed is 250m/s and exit angle of moving blade is 35° . Find the inlet angle of moving blade, exit velocity of steam & its direction and work done per kg of steam? 12M

*** END ***