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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**B.Tech III Year I Semester Supplementary Examinations August-2022****THERMAL ENGINEERING**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Explain the working of centrifugal compressor with neat sketch. **L2 6M**
b State the classifications of air compressor. **L1 6M**

OR

- 2 a Explain the working of Axial Flow compressor with neat sketch. **L2 6M**
b Construct the relation for Volumetric efficiency of a single stage reciprocating compressor. **L3 6M**

UNIT-II

- 3 The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1 bar and temperature of 20° C. The pressure of the air after compression is 4 bar. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The air-fuel ratio used is 90:1. If flow rate of air is 3 kg/s. find,(i) Power developed,(ii) Thermal efficiency of the cycle. **L3 12M**

OR

- 4 a Explain about the open cycle and closed cycle turbines with neat sketches and also draw the P-V & T-S diagrams. **L2 6M**
b Explain the advantages of gas turbine power plant over the steam turbine power plant. **L3 6M**

UNIT-III

- 5 Steam at a pressure of 10 bar and 0.9 dry discharges through a nozzle having throat area of 450 mm². If the back pressure is 1 bar. find i) Final velocity of the steam, and ii) cross-sectional area of the nozzle at exit for maximum discharge. **L3 12M**

OR

- 6 In a convergent nozzle initial velocity 5 m/s dry sat steam at a pressure of 10 bars and 250 °C is expanded Isentropically until the dryness fraction reaching 0.9. Find the final pressure of the steam and exit velocity of steam during the nozzle. By using Mollier diagram. **L3 12M**

UNIT-IV

- 7 a What are the advantages of steam turbine over steam engine? L1 6M
b Show the velocity triangle diagram of impulse turbine. L2 6M

OR

- 8 Steam at 5 bar and 200 °C is first made to pass through nozzles. It is then supplied L3 12M
to an impulse turbine at the rate of 30 kg/minute. The steam is finally exhausted to
a condenser at 0.2 bar. The blade speed is 300 m/s. The nozzles are inclined at 25°
with the direction of motion of the blades and the outlet blade angle is 35°
Neglecting friction, find the theoretical power developed by the turbine

UNIT-V

- 9 a Explain the working of 4-stroke Petrol engine. L2 6M
b Show the theoretical and actual valve-timing diagram for Petrol engine. L2 6M

OR

- 10 A two stroke cycle internal combustion engine has a mean effective pressure of 6 L3 12M
bar. 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.

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