R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Supplementary Examinations November-2020
THERMAL ENGINEERING
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 60

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

UNIT-I

1 a Compare 2-stroke engine with 4-stroke engine   **6M**
b With a neat sketch explain any three parts in Internal Combustion engine   **6M**

OR

2 A single cylinder and stroke cycle I.C. engine when tested, the following observations **12M** available :Area of indicator diagram = 3 sq.cm, Length of indicator diagram = 4 cm, Spring constant = 10 bar/cm, Speed of engine = 400 rpm, Brake drum diameter = 120 cm, Dead weight on brake = 380 N, Spring balance reading = 50 N, Fuel consumption = 2.8 kg/hr., Cv = 42000 kJ/kg, Cylinder diameter = 16 cm, Piston stroke = 20 cm. Find :

(i) F.P (ii) Mechanical efficiency (iii) BSFC and (iv) Brake thermal efficiency

UNIT-II

3 An air compressor cylinder has 150mm bore and 150mm stroke and the clearance is **12M** 15%. It operates between 1 bar, 27^0C and 5 bar. Take polytropic exponent n=1.3 for compression and expansion processes. Find

(i). Cylinder volume at the various salient points of in cycle.

(ii). Flow rate in m3/min at 720 rpm .

(iii). Volumetric efficiency.

OR

4 a Derive the relation for work done on single stage reciprocating compressor without **6M** clearance.
b With the help of neat sketch explain the working principle of multi stage **6M** reciprocating air compressor with effect of intercooler.

UNIT-III

5 a Explain with the help of neat diagram about Regenerative Cycle.   **6M**
b In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 30 bar **6M** and the exhaust pressure is 0.2 bar. Determine. (i) The pump work, (ii) Turbine work, (iii) Rankine efficiency, (iv) Condenser heat flow, (v) Dryness fraction at end of expression. Assume flow rate of 12kg/s.

OR

6 a Write the followings i) Enthalpy of Water ii) Enthalpy of Wet steam iii) Enthalpy **6M** of Dry steam iv) Enthalpy of super-heated steam
b Explain the followings i) dryness Fraction ii) saturated water iii) latent heat and **6M** iv) Sensible heat.

UNIT-IV

7 **a** Derive an expression for velocity of steam at exit of nozzle. **6M**
b What are the effects of friction on flow through nozzle? **6M**

OR

8 Dry saturated steam enters a steam nozzle at a pressure of 15 bar and is discharged at a pressure of 2 bar. If the dryness fraction of discharge steam is 0.96, what will be final velocity of steam? **12M**

UNIT-V

9 Explain about the various methods of Governing steam turbines with neat sketches. **12M**

OR

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. **12M**

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