

III-SEM/ELECTRICAL/2019(W) (NEW)  
TH.-3-ELEMENTS OF MECHANICAL ENGINEERING

Figures in the right-hand margin indicate marks  
(Use of steam table allowed)

Full Marks: 80

Time: 3 Hrs

Answer any five Questions including Q.No.1 & 2

Figures in the right hand margin indicates marks

1 Answer ALL Questions

5X6=30

- a) Define heat and work and write their units in SI system.
- b) Define steam and uses of steam.
- c) What is wet steam?
- d) Define mountings of boiler with example.
- e) What is mean effective pressure?
- f) Define reaction turbine with example.
- g) What is stroke length and write down its unit?
- h) Define density and its unit
- i) What is the function of hydraulic accumulator?
- j) What is the difference between Pascal and bar?

2. Answer any SIX question.

5X6=30

- a) Explain classification of boilers.
- b) Derive Continuity equation.
- c) Describe Properties of fluid.
- d) Describe working of hydraulic lift with neat sketch.
- e) Difference between two stroke engine & four stroke engine.
- f) A 30cm diameter pipe, conveying water branches into two pipes of diameters 20cm and 15cm respectively. If the average velocity in the 30cm diameter pipe is 2.5m/sec. Find the discharge in this pipe. Also determine the velocity in 20cm diameter pipe is 2m/sec.
- g) Explain energy of flowing liquid.
- h) Derive the relationship between  $C_p$ ,  $C_v$  &  $R$ .

3. Define Grate and describe working of Cochran boiler with neat sketch.

10

4. State and explain Bernoulli's theorem.

10

5. In a single cylinder double acting steam engine, steam is admitted at a pressure of 12 bar and is exhausted at 1.3 bar. The cylinder bore is 250mm and stroke length is 450mm. The cut off takes place at 40% of the stroke. The engine speed is 260rpm. Neglecting clearance and assuming a diagram factor of 0.9. Determine the indicated power of the engine.

10

6. Explain working of two stroke petrol engine with neat sketch

10

7. a) Define dryness fraction of steam.

b) Calculate the enthalpy of 1kg of steam at a pressure of 8 bar and dryness fraction of 0.8. How much heat would be required to raise 5kg of this steam from water at 20°C

2+8