

# CBCS SCHEME



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18ME15/25

First/Second Semester B.E. Degree Examination, Aug./Sept.2020

## Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Use of steam tables is permitted.*

### Module-1

- 1 a. Differentiate renewable energy sources with non-renewable sources. (04 Marks)  
b. Briefly explain Global Warming and Ozone depletion. (08 Marks)  
c. Define Zeroth, 1<sup>st</sup> law, 2<sup>nd</sup> law and 3<sup>rd</sup> law of thermodynamics. (08 Marks)

OR

- 2 a. Define:  
(i) Internal energy  
(ii) Enthalpy  
(iii) Entropy (06 Marks)  
b. Explain the formation of steam. (06 Marks)  
c. Explain briefly the application of hydel, wind, nuclear and bio-fuels. (08 Marks)

### Module-2

- 3 a. Explain the working of Lancashire boiler with neat sketch. (10 Marks)  
b. With neat sketch, explain working of Francis turbine. (10 Marks)

OR

- 4 a. List and explain functions of any four boiler mountings. (06 Marks)  
b. Explain the working of centrifugal pump with neat sketch. (08 Marks)  
c. Explain the phenomenon of priming and cavitation in pump. (06 Marks)

### Module-3

- 5 a. Explain the working of four-stroke diesel engine with neat sketch. (10 Marks)  
b. A single cylinder two stroke petrol engine develops 7.5 KW at 2500 rpm. The mean effective pressure on the piston is 8 bar and mechanical efficiency is 80%. Calculate the diameter and stroke length of the cylinder if stroke to bore ratio is 1.5, also calculate the fuel consumption rate if the brake thermal efficiency is 28%. The calorific value of the fuel used is 43,900 kJ/kg. (10 Marks)

OR

- 6 a. Define:  
(i) Refrigerating effect  
(ii) Tonn of refrigeration  
(iii) Ice making capacity  
(iv) Coefficient of performance  
(v) Unit of refrigeration (10 Marks)  
b. With a neat sketch, explain the working of vapour compression refrigeration. (10 Marks)



18ME15/25

**Module-4**

- 7 a. Write short note on smart materials and shape memory alloys. (08 Marks)  
b. Explain with neat sketch the oxy-acetylene gas welding. (08 Marks)  
c. Explain briefly thermoplastics and thermosetting polymers. (04 Marks)

**OR**

- 8 a. Define velocity ratio of belts. Derive the length of the belt in open drive. (10 Marks)  
b. List the advantages of V-belts over flat belts. (04 Marks)  
c. Explain spur, helical and bevel gears. (06 Marks)

**Module-5**

- 9 a. Explain the following lathe operations:  
(i) Turning  
(ii) Facing  
(iii) Knurling  
(iv) Drilling (10 Marks)
- b. Explain the following milling operations:  
(i) Plane milling  
(ii) End milling  
(iii) Slot milling  
(iv) Gang milling (10 Marks)

**OR**

- 10 a. With a neat sketch, explain components of CNC system. (08 Marks)  
b. List the advantages of CNC machines. (04 Marks)  
c. Explain the application of Robots in material handling and assembly. (08 Marks)

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