

# CBCS SCHEME

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18ME15/25

## First/Second Semester B.E. Degree Examination, July/August 2021 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions.**

**2. Use of Thermodynamics data hand book is permitted.**

**3. Use of steam tables is permitted.**

- 1** a. Explain briefly the principle of power plant with a neat sketch. (10 Marks)  
b. Write a note on following solar energy technologies:  
(i) Photovoltaic technology (10 Marks)  
(ii) Flat plate collector
- 2** a. Briefly describe steam formation with the help of T-H diagram. (10 Marks)  
b. Find the enthalpy of 1 kg of steam at 12 bar when (i) Steam is dry saturated (ii) Steam is 22% wet (iii) super heated to 250°C. Use the steam table. Assume the specific heat of the super heated steam as 2.25 kJ/kgK. (06 Marks)  
c. Define the following: (i) Sensible heat (ii) Degree of superheat. (04 Marks)
- 3** a. Explain the working principle of Lancashire boiler with neat sketch. (10 Marks)  
b. Explain how to classify the water turbine. (04 Marks)  
c. Differentiate between pelton wheel turbine and Kaplan turbine. (06 Marks)
- 4** a. With a neat sketch, explain the working principle of centrifugal pump. (10 Marks)  
b. Explain the working principle of Kaplan turbine with a neat sketch. (10 Marks)
- 5** a. Differentiate between SI engine and CI engine. (04 Marks)  
b. Explain the working principle of 4-stroke SI engine with P-V diagram. (10 Marks)  
c. A 2 stroke C.I. engine has a cylinder diameter of 200 mm and stroke length of 300 mm. The engine has a mean effective pressure of 2.8 bar and a speed of 400 rpm. The effective diameter of break drum is 1 m and effective load on it is 64 kg. Determine the following :  
(i) IP (ii) BP (iii) Mechanical efficiency (06 Marks)
- 6** a. Define the following:  
(i) Refrigeration  
(ii) Refrigerating effect  
(iii) Ton of refrigeration  
(iv) Ice making capacity (08 Marks)  
b. Differentiate between VCR and VAR. (06 Marks)  
c. Explain the working of room air condition system with a neat sketch. (06 Marks)
- 7** a. Write a note on classification and application of ferrous and nonferrous metals. (10 Marks)  
b. Define the following:  
(i) Welding  
(ii) Brazing  
(iii) Soldering (06 Marks)  
c. Define composite material. Mention any two applications. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 8 a. Derive an equation for length of belt in cross belt drive. (10 Marks)  
 b. Write a note on velocity ratio of belt drive. (04 Marks)  
 c. A gear wheel of 20 teeth drives another gear wheel having 36 teeth running at 200 rpm, find the speed of the driving wheel and the velocity ratio. (06 Marks)
- 9 a. Explain the following operations on lathe with suitable sketches:  
 (i) Facing  
 (ii) Thread cutting  
 (iii) Plain turning  
 (iv) Knurling (08 Marks)  
 b. Explain the following operations on milling machines with suitable sketches:  
 (i) Plain milling  
 (ii) Slot milling  
 (iii) Straddle milling  
 (iv) Gang milling (08 Marks)  
 c. Explain taper turning by compound slide swiveling method with sketch. (04 Marks)
- 10 a. Explain the basic components of CNC machine with a block diagram. (10 Marks)  
 b. What are the applications of Robots and also write down the advantages of robots. (10 Marks)

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