

# CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

21EME15/25

First/Second Semester B.E. Degree Examination, Jan./Feb. 2023

## 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 thermodynamic data handbook is permitted.*

### Module-1

- 1 a. Explain the formation of steam with the help of Temperature – Enthalpy [T – H] diagram. (10 Marks)  
b. With a neat sketch explain, construction and working principle of Hydel power plant. (10 Marks)

OR

- 2 a. Find the enthalpy of 2 kg of steam at 12 bar when  
i) Steam is dry saturated  
ii) Steam is 85% dry  
iii) Superheated at 250°C  
Assume the specific heat of superheated steam as 2.25 kJ/kg-K. (10 Marks)  
b. With a neat sketch explain the working principle of Pelton turbine. (10 Marks)

### Module-2

- 3 a. Write a note on:  
i) Piezo - electric materials  
ii) Glass  
iii) Semi-conductors  
iv) Shape-memory alloys (08 Marks)  
b. Differentiate between soldering, brazing and welding processes. (12 Marks)

OR

- 4 a. With the help of neat sketch explain Oxy-acetylene gas welding process. (10 Marks)  
b. Write a note on three modes of heat transfer phenomena. (10 Marks)

### Module-3

- 5 a. Explain with the help of theoretical P-V diagram working of four stroke diesel engine. (10 Marks)  
b. Define the following :  
i) Refrigeration process  
ii) Refrigeration effect  
iii) Ton of refrigeration  
iv) COP  
v) Air-conditioning process. (10 Marks)

OR

- 6 a. List and explain the desirable properties of a good refrigerant. (10 Marks)  
b. With the help of neat sketch, explain the working principle of room air-conditioning system. (10 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.

**Module-4**

- 7 a. Define velocity ratio of belt drives. Explain with a neat sketch open belt drive. (10 Marks)  
b. Define Machines and Mechanisms. Enumerate the applications of linear motion, oscillatory motion and rotary motion. (10 Marks)

**OR**

- 8 a. Give a brief comparison between belt drive and gear drive. (06 Marks)  
b. Write a note on :  
i) Spur Gear                      ii) Bevel Gear (04 Marks)  
c. Define Robotics. With a neat sketch explain Jointed-arm configuration robot. (10 Marks)

**Module-5**

- 9 a. With a help of necessary sketches explain the following lathe operations :  
i) Turning  
ii) Facing  
iii) Knurling  
iv) Taper turning by swivelling compound rest. (12 Marks)  
b. Explain the components of CNC machine with a neat block diagram. (08 Marks)

**OR**

- 10 a. Explain with a neat sketch the following operations:  
i) Plane milling  
ii) End milling  
iii) Drilling  
iv) Boring (12 Marks)  
b. Define mechatronics. With a neat block diagram explain closed loop control system. (08 Marks)

\*\*\*\*\*