

# CBCS SCHEME

USN

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

18MN46

## Fourth Semester B.E. Degree Examination, Jan./Feb. 2023 Thermodynamics and Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. With examples distinguish between :
- i) Open and Closed systems
  - ii) Extensive and Intensive property
  - iii) Reversible and Irreversible process
  - iv) Path and point function
- (08 Marks)
- b. Derive an expression for workdone in the following process with PV diagram
- i) Isochoric process
  - ii) Isobaric process
  - iii) Polytropic process.
- (12 Marks)

OR

- 2 a. A gas confined in a cylinder by a piston is at pressure of 3 bars and a volume of  $0.015\text{m}^3$ , the final pressure is 1.5bar. Determine the magnitude and direction of work transfer for the following processes i)  $P \propto V$  ii)  $P \propto 1/V$  iii)  $P \propto V^2$  iv)  $P \propto 1/V^2$ . (12 Marks)
- b. Explain what do you understand by thermodynamic equilibrium and state Zeroth law. (08 Marks)

### Module-2

- 3 a. Explain with neat sketch Joule's experiment for 1<sup>st</sup> law of thermodynamics. (10 Marks)
- b. Explain the corollaries of 1<sup>st</sup> law of thermodynamics (10 Marks)

OR

- 4 a. Derive an expression for work-done in single stage air compressor without clearance volume. (10 Marks)
- b. List the application of air compressor in underground and open cast mining. (10 Marks)

### Module-3

- 5 a. Calculate the specific weight, density and specific gravity of one litre of liquid which weight 7N. (08 Marks)
- b. Define surface tension. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by  $P = 4 \sigma/d$  (12 Marks)

OR

- 6 a. With sketch, explain the working of orifice meter (10 Marks)
- b. Explain the fluid flow measurement using venturimeter with neat sketch. (10 Marks)

**Module-4**

- 7 a. Derive an expression for total pressure and center of pressure for a inclined plane surface submerged in liquid. (10 Marks)  
b. With a neat sketch, explain Bourdon pressure gauge. (10 Marks)

**OR**

- 8 a. Explain the method of finding meta centric height experimentally. (10 Marks)  
b. Define Buoyancy. (04 Marks)  
c. Explain the condition of equilibrium of a floating and submerged bodies. (06 Marks)

**Module-5**

- 9 a. Derive Bernoulli's equation from Euler's equation of motion. (10 Marks)  
b. Write the assumption and limitations of Bernoulli's equation. (10 Marks)

**OR**

- 10 a. Explain the concept of HGL and TEL with neat sketch. (10 Marks)  
b. Derive Euler's equation from 1<sup>st</sup> principle and write the assumption made. (10 Marks)

\* \* \* \* \*