



CBCS SCHEME

18MT42

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025 Fluid Mechanics and Machines

Time: 3 hrs.

Max. Marks : 100

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

Module-1

- 1 a. Define Newton's law of viscosity? Describe classification of fluids based on viscosity. (08 Marks)
b. Define Capillarity. Derive an expression for capillary rise. (06 Marks)
c. Explain surface tension, vapour pressure and cavitations. (06 Marks)

OR

- 2 a. State and prove the Pascal's law. (08 Marks)
b. A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to the atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in two limbs is 40 cm and the height of fluid in the left limb from the centre of the pipe is 15 cm below. (06 Marks)
c. Define total pressure and centre of pressure. (06 Marks)

Module-2

- 3 a. Explain the types of fluid flow. (08 Marks)
b. Derive continuity equation for the 3 dimensional flows. (12 Marks)

OR

- 4 a. With assumptions explain Bernoulli's equation from Euler's equation. (08 Marks)
b. The water is flowing through a pipe having diameter 20cm and 10cm at section 1 and 2 respectively. The rate of flow through pipe is 35 litres/sec. The section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24 N/cm^2 . Find the intensity of pressure at section 2. (12 Marks)

Module-3

- 5 a. Explain Dimensionally Homogeneous equation. (04 Marks)
b. What do you mean by similitude? Explain types of similitudes. (08 Marks)
c. Explain in brief about the following :
i) Dimensionless number ii) Reynold's number
iii) Euler's number iv) Mach number. (08 Marks)

OR

- 6 a. Derive an expression for discharge through venturimeter. (10 Marks)
b. Explain Pitot tube, with a neat sketch. (04 Marks)
c. Water flows over a rectangular weir 1m wide at a depth of 150mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangle weir as 0.62 and 0.59 respectively, find the depth over the triangular weir. (06 Marks)

Module-4

- 7 a. Define turbomachines. Explain its principle components. (08 Marks)
b. Distinguish between positive displacement machines and turbomachines. (12 Marks)

OR

- 8 a. Derive Euler's turbine equation with suitable diagrams. (08 Marks)
b. Explain components of energy transfer obtaining alternate form of Euler turbine equation. (12 Marks)

Module-5

- 9 a. Define Hydraulic turbines. Explain the classification of hydraulic turbines. (10 Marks)
b. Draw the inlet and exit velocity triangles for pelton wheel turbine. Obtain the expression for maximum hydraulic efficiency. (10 Marks)

OR

- 10 a. Explain velocity and pressure compounding of steam turbines. (10 Marks)
b. Steam issuing from a nozzle to a De-Laval turbine with a velocity of 1000m/s. The nozzle is 20° . The mean blade speed is 400m/s. The blades are symmetrical, the mass flow rate = 1000kg/hr, friction factor = 0.8, nozzle efficiency = 0.95. Calculate:
i) The blade angles
ii) Axial thrust
iii) Work done per kg of steam
iv) Power developed
v) Blade efficiency
vi) Stage efficiency. (10 Marks)
