

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZIANAGARAM
II B. Tech I Semester Supplementary Examinations, November – 2024
FLUID MECHANICS
(CIVIL ENGINEERING)

Time: 3 hours**Max. Marks: 70**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks

- 1 a) Differentiate between absolute viscosity and kinematic viscosity and mention their units. [7]
b) Explain various types of manometers with neat sketches. [7]
(OR)
- 2 a) Define the following: (i) Atmospheric pressure, (ii) Gauge pressure, (iii) Vacuum pressure, and (iv) Absolute pressure. [7]
b) An isosceles triangular plate of base 3 m and altitude 3 m is immersed vertically in an oil of specific gravity 0.8. The base of the plate coincides with the free surface of oil. Determine: (i) Total pressure on the plate; (ii) Centre of pressure. [7]
- 3 a) Explain the classification of fluid flow. [7]
b) Derive Bernoulli's equation from Euler's equation of motion. [7]
(OR)
- 4 a) Explain the terms streak line, Path line, stream line, stream tube. [7]
b) Derive the continuity equation for a 3-D fluid flow. [7]
- 5 a) Describe Reynold's experiment to demonstrate the type of flow. [7]
b) What are the various minor Losses in flow through pipes? Give the equation for each case. [7]
(OR)
- 6 a) Explain the terms total energy line and hydraulic gradient line, with a neat sketch. [7]
b) Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths 450 m, 255 m and 315 m respectively are connected in series. The difference in water surface levels in two tanks is 18 m. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively by neglecting minor losses. [7]
- 7 a) What is a pitot tube and explain with a neat sketch. [7]
b) A pipe of 30 cm diameter inclined 30° to the horizontal is carrying gasoline (specific gravity = 0.82). A venturi meter is fitted in the pipe to find out the flow rate whose throat diameter is 15 cm. The throat is 1.2 m from the entrance along its length. The pressure gauges fitted to the venturi meter read 140 kN/m^2 and 80 kN/m^2 respectively. Find out the coefficient of discharge of venturi meter if the flow is $0.20 \text{ m}^3/\text{s}$. [7]
(OR)
- 8 a) Explain the difference between a notch and a weir. [7]
b) Write short notes on the following: (i) Broad crested weir (ii) Ogee weir. [7]

- 9 a) What is boundary layer? Explain the growth of boundary layer along a thin flat plate, with a neat sketch. [7]
b) Prove that the momentum thickness and energy thickness for boundary layer flows are given by $\theta = \int_0^\delta \frac{u}{U} \left(1 - \frac{u}{U}\right) dy$ [7]

(OR)

- 10 a) Obtain Von Karman momentum integral equation. [7]
b) Define displacement thickness. Derive an expression for the displacement thickness. [7]
