

F 3083

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

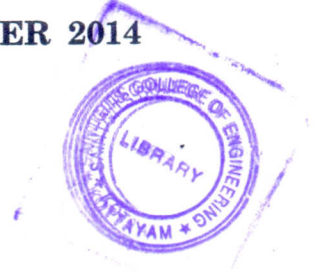
Third Semester

Branch : Civil Engineering

FLUID MECHANICS—I (C)

(Old Scheme—Prior to 2010—Admissions)

[Supplementary/Mercy Chance]



Time : Three Hours

Maximum : 100 Marks

Part A

*Answer all questions.
Each question carries 4 marks.*

1. Define "ideal plastic fluid". Explain.
2. Briefly discuss : "pressure head".
3. Distinguish between compressible and incompressible flow.
4. What are the limitation of "flow net" ?
5. State the "impulse-momentum" equation.
6. Differentiate between broad crested weir and narrow crested weir.
7. What do you mean by "equivalent pipe" ?
8. Differentiate between stream-lines body and bluff body.
9. What is the significance of Reynold's number for fluid-flow problems ?
10. Write a note on selection of repeating variables in dimensional analysis.

(10 × 4 = 40 marks)

Part B

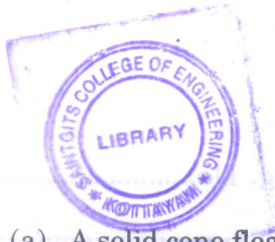
*Answer all questions.
Each question carries 12 marks.*

11. (a) A follow circular plate of 2m external and 1m internal diameter is immersed vertically in water such that the centre of plate is 4m deep from water surface. Find the total pressure and depth of centre of pressure.

Or

- (b) Distinguish between manometers and mechanical gauges with neat sketch. Explain the different types of mechanical pressure gauges.

Turn over



12. (a) A solid cone floats in water with its apex downwards. Determine the least apex angle of cone for stable equilibrium. The specific gravity of the material of the cone is given as 0.8.

Or

- (b) An open circular cylinder of 15 cm diameter and 100 cm long contains water upto a height of 80 cm. Find the maximum speed at which the cylinder is to be rotated about its vertical axis so that no water spills.
13. (a) A venturimeter is used for measurement of discharge of water in horizontal pipe line. If the ratio of upstream pipe diameter to that of throat is 2 : 1, upstream diameter is 300 mm, the difference in pressure between the throat and upstream is equal to 3m head of water and loss of head through meter is one-eighth of the throat velocity head, calculate the discharge in the pipe.

Or

- (b) An orifice meter with orifice diameter 10 mm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream and downstream of the orificemeter gives readings of 19.62 N/cm² and 9.81 N/cm² respectively. Co-efficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.
14. (a) A pipeline of length 2000 m is used for power transmission. If 110.3625 kW power is to be transmitted through the pipe in which water having a pressure of 490.5 N/cm² at inlet is flowing. Find the diameter of the pipe and efficiency of transmission if the pressure drop over the length of pipe is 98.1 N/cm². Take $f = 0.0065$.

Or

- (b) Hydrodynamically smooth pipe carries water at the rate of 300 l/s at 20°C ($\rho = 1000 \text{ kg/m}^3$, $\nu = 10^{-6} \text{ m}^2/\text{s}$) with a head loss of 3m in 100 m length of pipe. Determine the pipe diameter.

$$\text{Use } f = 0.0032 + \frac{0.221}{(\text{Re})^{0.237}} \text{ equation for } f, \text{ when } h_f = \frac{f \times L \times v^2}{D \times 2g} \text{ and } \text{Re} = \frac{\rho V D}{\mu}.$$

15. (a) Explain the procedure for dimensional analysis using Buckingham's pi-theorem. Discuss any two applications.

Or

- (b) Explain :—

- (i) Fraude's model law. (4 marks)
- (ii) Selection of scale models. (4 marks)
- (iii) Spillway models. (4 marks)

(5 × 12 = 60 marks)