F 4769 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

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. Explain Newton's Law of viscosity.
2. Define centre of pressure.
3. What are the advantages of venturimeter over orifice meter ?
4. Explain the use of notches.
5. Define metacentre and centre of buoyancy.
6. Explain circulation.
7. Explain hydraulic grade line and total energy line.
8. Explain drag and lift for immersed bodies.
9. Differentiate between distorted and undistorted models.
10. What is meant by kinematic similarity ?

(10 × 4 = 40 marks)

Part B

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

11. (a) Calculate the specific weight, density and specific gravity of 5 litres of a liquid which weigh 50 N.

Or

(b) Derive an expression for the location of centre of pressure of a lamina submerged in a liquid such that it makes an angle θ with the liquid surface.

Turn over

12. (a) Discuss the conditions of equilibrium of floating and submerged bodies.

Or

(b) Derive continuity equation for one dimensional flow of an in compressible fluid.

13. (a) Derive an expression for the co-efficient of discharge through a venturimeter.

Or

(b) A cipollet, weir of crest length 60 cm discharges water. The head of water over the weir is 360 mm. Find the discharge over the weir if the channel is of 80 cm wide and 50 cm deep. Take $C_d = 0.60$.

14. (a) Derive an expression for the head loss due to friction in a pipe.

Or

(b) A rough pipe of diameter 400 mm and length 100 m carries water at the rate of 0.4 m^3/s. The wall roughness is 0.022 mm. Determine the co-efficient of friction, wall shear stress , centre line velocity and velocity at a distance of 150 mm from the pipe wall.

15. (a) A model of spillway is made to test the flow. The discharge and the velocity of flow over the model were measured as 2.5 m^3/s and 1.5 m/s respectively. Find the discharge and the velocity over the prototype which is 50 times larger than its model.

Or

(b) Fluid of density s and viscosity μ flows at an average velocity v through a circular pipe of diameter d. Show by dimonsional analysis that the shear stress of the pipe wall

$$J_0 = \rho v^2 f\left(\frac{\rho v d}{\mu}\right).$$

(5 × 12 = 60 marks)