Roll No. ..... Total Pages : 3

002403

August/September 2022
B.Tech. (Civil) IV Semester
Basics of Fluid Mechanics / Introduction to Fluid Mechanics
(PCC-CE-204R / PCC-CE-204)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) Real fluid. (1.5)
(b) Kinematic Viscosity. (1.5)
(c) Turbulent flow. (1.5)
(d) Meta centre of body. (1.5)
(e) Compressibility. (1.5)
(f) Surface tension. (1.5)
(g) One Poise. (1.5)

(h) 1-D, 2-D and 3-Dimensional Flow. (1.5)

(i) Mach Number. (1.5)

(j) Centre of buoyancy. (1.5)

PART-B

2. (a) What do you understand by Capillary Fall and Capillary Rise. Derive the expression for them. (10)

(b) What do you understand by Single Column Manometer ? Explain with the help of neat sketch. (5)

3. (a) Find the surface tension in a soap bubble of 30 mm diameter when the inside pressure is 1.962 N/m^2 above atmosphere. (5)

(b) The velocity component for a two dimensional incompressible flow are given by $u = 3x - 2y$ and $v = -3y - 2x$. Show that the velocity potential exists. Determine the velocity potential function and stream function. (10)

4. A simple U-Tube manometer containing mercury is connected to pipe in which a fluid of sp.gr. 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe. If the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below. (15)

5. (a) Discuss the term Cavitation and losses due to cavitation. (5)

(b) How will you determine the metacentric height of a floating body experimentally? Explain with neat sketch. (10)

6. (a) Explain Euler's equation of motion. What are the kinetic energy correction factor and momentum correction factors? (10)

(b) Discuss and explain the Buckingham's Pie Theorem in detail. (5)

7. Explain the difference in following types of flow :

(i) Steady and unsteady flow.

(ii) Uniform and non-uniform flow.

(iii) Rotational and irrotational flow.

(iv) Compressible and incompressible flow. (15)
