



7. (a) Classify different types of fluid flows. (9)
- (b) Derive Bernoulli's equation. Also write various assumptions to drive the equation. (6)

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**B.Tech. (Civil) - IV SEMESTER**  
**BASICS OF FLUID MECHANICS**  
**(PCC-CE-204R)**

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.*
4. *Assume suitable missing data.*

**PART-A**

1. (a) Define Specific gravity. (1.5)
- (b) Define fluid. (1.5)
- (c) Define surface tension. (1.5)
- (d) What is the use of U-tube differential manometer? (1.5)

- (e) Define metacenter and metacentric height. (1.5)
- (f) Define hydrostatic law. (1.5)
- (g) Define Pascal's law. (1.5)
- (h) Define stream tube. (1.5)
- (i) Define Froude Number. (1.5)
- (j) State Bernoulli's theorem. (1.5)

### PART-B

2. (a) Distinguish between ideal fluid and real fluid. Explain the importance of compressibility in fluid. (8)
- (b) Determine specific gravity of fluid having viscosity 0.07 poise and kinematic viscosity 0.042 stokes. (7)
3. (a) What do you mean by buoyancy? Discuss the stability of floating bodies. (8)
- (b) Find the total pressure and position of center of pressure on a triangular plate of base 2 m and height 3 m which is immersed in water in such a way that the plan of the plate makes an angle of  $60^\circ$  with the free surface of water. The base of the plate is parallel to the water surface and at a depth of 2.5 m from the water surface. (7)
4. (a) Define stream function and velocity potential functions. What are the relations between these two? Also prove that stream lines and equipotential lines are orthogonal to each other. (8)

- (b) For velocity component given as

$$u = ay \sin xy, v = ax \sin xy.$$

Obtain expression for velocity potential function. (7)

5. (a) Draw orifice meter. Derive the formula for measuring discharge with the help of orifice meter. (8)
- (b) A 20 cm  $\times$  10 cm venturimeter is inserted in a vertical pipe carrying oil of specific gravity 0.8, the flow of oil is in upward direction. The difference of level between the throat and inlet section is 50 cm. The oil differential manometer gives a reading of 30 cm of Hg. Find the discharge of oil. Neglect losses. (7)
6. (a) One liters of oil weighs 9.6 N. Calculate its specific weight, mass density, specific gravity and specific volume. (7)
- (b) Find out the differential reading 'h' of an inverted U-tube manometer containing oil of specific gravity 0.7 as the manometric fluid when connected across pipes A and B as shown in Fig 1, conveying liquids of specific gravities 1.2 and 1.0 and immiscible with manometric fluid. Pipes A and B are located at the same level and assume the pressures at A and B to be equal. (8)