

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (Sem.-4)

FLUID MECHANICS-I

Subject Code : ME-206

Paper ID : [A0810]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. Write briefly :

- (a) Define bulk modulus. How it is related to compressibility?
- (b) State Pascal's law.
- (c) What is meant by intensity of pressure? How it varies with depth of fluid?
- (d) Write Bernoulli's equation.
- (e) Define stream function and potential function.
- (f) What is the significance of dimensional less numbers?
- (g) Define stream line, path line and streak line.
- (h) What are the various flow measurement devices?
- (i) Define Froude number.
- (j) What is Archimede's Principle?

SECTION-B

2. A solid cube of sides 0.5m each is made of material of relative density 0.5. The cube floats in liquid of relative density 0.95 with two of its faces horizontal. Calculate metacentric height. Comment on stability.
3. A flow is described by the stream function $4xy$. Locate the point at which the velocity vector has a magnitude 7 units and makes an angle of 150° with X axis.
4. Derive the Euler's equation in Cartesian Coordinates.
5. A horizontal venturimeter with inlet diameter 200mm and throat diameter 100mm is employed to measure the flow of water. The reading of differential manometer connected to inlet is 180mm of mercury. If the coefficient of discharge is 0.98 determine the rate of flow.
6. Describe an orifice meter and find an expression for measuring discharge through a pipe with this device.

SECTION-C

7. The resisting force F of a plane during flight can be considered as dependent upon the length of aircraft, velocity, air viscosity, air density and bulk modulus of air. Express the functionality relationship between these variables and the resisting force using dimensional analysis.
8. Discuss major and minor head losses in pipes.
9. A solid of 200mm diameter and 800mm length has its base 20mm thick and of specific gravity 6. The remaining part of the cylinder is of specific gravity 0.6. State if it can float vertically in water.