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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards) (Sem.-4)

**FLUID MECHANICS**

Subject Code : BTME-403

M.Code : 59131

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS 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**

Answer briefly :

1. Define Bulk Modulus. How it is related to compressibility?
2. State Pascal's law.
3. What is meant by intensity of pressure? How it varies with depth of fluid?
4. Write continuity equation in polar coordinates.
5. Write the four properties of stream function.
6. What do you mean by dimensional homogeneity and what are its applications?
7. What is the stability criterion of submerged body?
8. Define Stream Line, path line and streak line.
9. Define Reynold's Number.
10. What are the various flow measurement devices?

### SECTION-B

11. Derive an expression to find metacentric height analytically.
12. Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of water. Find the position of centre of pressure.
13. Derive continuity equation in polar coordinates.
14. The velocity potential function for a two dimensional flow is given by  $x(2y-1)$ , calculate the velocity at the point (4,5). Find the stream function at this point also.
15. Derive Euler's Equation of motion.

### SECTION-C

16. 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.
17. Discuss in detail five minor losses in pipes.
18. An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives readings of  $19.62 \text{ N/cm}^2$  and  $9.81 \text{ N/cm}^2$  respectively. Co-efficient of discharge is 0.6. Find the discharge of water through pipe.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**