

**Roll No.**

**Total No. of Pages : 02**

**Total No. of Questions : 09**

**B.Tech. (ANE) (Sem.-3)**

# FLUID MECHANICS

**Subject Code : ME-206**

**M.Code : 60538**

**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

- 1. Distinguish between the following :**

- (a) Compressible and incompressible flow
- (b) Ideal and real fluids
- (c) Viscous and inviscid flow
- (d) Stream line and streak line
- (e) Newtonian and Non-Newtonian flows
- (f) Rotational and potential flows
- (g) Free and forced vortex motion
- (h) Reynolds Number and critical Reynolds Number
- (i) Laminar and turbulent flow
- (j) Steady and unsteady flow

## SECTION-B

2. What is flow similarity? How non-dimensional numbers affect the similarity of flow. (2,3)
3. Define Stream Function and potential function. Given that  $u = x^2 - y^2$  and  $v = -2xy$ , determine the stream function and potential function for the flow. (2,3)
4. Define Vorticity. Derive the condition for irrotational flow. (2,3)
5. Show a pitot tube using a neat and labelled sketch. Explain how the velocity of fluid flow is measured with the help of a Pitot tube. (2,3)
6. Explain boundary layer concept and phenomenon of turbulent boundary layer over a flat plate. (2,3)

## SECTION-C

7. Write notes on the following :
  - (a) Buckingham's Pi theorem for dimensional analysis. (5)
  - (b) Significance of Euler's equation, Bernoulli's equation and steady flow energy equation (5)
8. (a) What are the functions of manometers? Explain various types of manometers. (2,3)  
(b) A pipeline carrying oil of specific gravity 0.87 changes in diameter from 200mm at a position 'A' to 500mm diameter at a position 'B' which is at a higher level by 4m. If the pressure at 'A' and 'B' are  $9.81 \text{ N/m}^2$  and  $5.886 \text{ N/cm}^2$  respectively and the discharge is 200 litres/sec, determine the loss of head and direction of flow. (5)
9. Explain the following :
  - (a) Pascal's law and its engineering applications. (3)
  - (b) Flow measurement using weirs and notches. (3)
  - (c) Reynolds experiments for demonstrating two types of flow. (4)

**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.**