Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards)   (Sem.–4)
FLUID MECHANICS
Subject Code : BTME-403
M.Code : 59131

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. **Answer briefly :**

   (a)   Define term dynamic viscosity and mention their unit.

   (b)   What do you understand by centre of pressure?

   (c)   Define the term meta centric height.

   (d)   Write two properties of stream function.

   (e)   What do you understand by uniform and non uniform flow?

   (f)   State Bernoulli's equation and write the equation for real fluid.

   (g)   What is the difference between model and prototype?

   (h)   What are the various minor losses?

   (i)   Define Froude's number.

   (j)   What is a weir?

SECTION-B

2. Derive an expression for total force and centre of pressure for horizontal plane surface submerged in liquid.

3. A block of wood of specific gravity 0.7 floats in water. Determine the meta-centric height of the block if its size is 2m × lm × 0.8m.

4. If for a two dimensional stream function is 2xy, determine the velocity at point P(2,3). Also calculate the value of potential function at point P.

5. A pipeline carrying oil of specific gravity 0.87, changes in diameter from 200mm diameter at position A to 500mm diameter at a position B which is 4m at a higher level. If the pressures at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and discharge is 200 liters/s determine loss of head.

6. Find the kinematic viscosity of oil having density 981kg/m^3. The shear stress at a point in oil is 0.2452N/m^2 and velocity gradient at that point is 0.2 per second.

SECTION-C

7. Derive an expression for the loss of head due to friction in pipes.

8. The pressure difference in a pipe of diameter D and length 1 due to turbulent flow depends on the velocity, dynamic viscosity, density and roughness k. Using Buckingham pi theorem express pressure in terms of dimension less parameters.

9. An open channel of most economical section, having the form of a half hexagon with horizontal bottom is required to give a maximum discharge of 20.2m^3/s of water. The slope of the channel bottom is 1 in 2500. Taking Chezy's constant 60, determine the dimensions of the cross-section.

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.