

**B.Tech. Mechanical Engineering / B.Tech Civil  
Engineering (BTMEVI/BTCLEVI)**

**Term-End Examination**

**December, 2013**

**BIME-004 : FLUID MECHANICS**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note: Attempt All five questions. All questions carry equal marks.*

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1. Attempt *any two* questions : **2x7=14**
- (a) A plate, 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2N per unit area i.e  $2\text{N/m}^2$  to maintain the speed. Determine the fluid viscosity between the plates.
- (b) Difference between :
- (i) Absolute pressure and gauge pressure
- (ii) simple manometer and differential manometer
- (iii) piezometer and pressure gauges.
- (c) Define the terms 'buoyancy', 'centre of buoyancy', centre of pressure and meta centre.
2. Attempt *any two* question : **2x7=14**
- (a) the velocity potential function ( $\phi$ ) is given by an expression
- $$\phi = -xy^3/3 - x^2 + x^3y/3 + y^2$$
- (i) find the velocity component in  $x$  and  $y$  direction

- (b) Differentiate between :
- (i) Stream function and velocity potential function.
  - (ii) Rotational and irrotational flow.
  - (iii) Steady and unsteady flow.
- (c) What are the methods of describing fluid flow ?

3. Attempt *any two* questions : 2x7=14

- (a) The water is flowing through a pipe having diameters 20 cm and 10 cm at section 1 and 2 respectively the rate of flow through pipe is 35 litres/s the section 1 is 6m above datum and section 2 is 4m above datum. If the pressure at section 1 is 39.24 N/cm<sup>2</sup>. Find the intensity of pressure at section 2.
- (b) How are the weirs and notches classified ?
- (c) What are the advantage of triangular notch or weir over rectangular notch ?

4. Attempt *any two* questions : 2x7=14

- (a) Define the terms : model, prototype, model analysis, hydraulic similitude.
- (b) What do you mean by dimensionless number ? Name any four dimensionless number.
- (c) What are the different laws on which models are designed for dynamic similarity ? Explain them.

5. Write a short note on *any three* : 14

- (a) Boundary layer separation
- (b) Couette flow
- (c) Orifice meter
- (d) Water hammer
- (e) Syphon