



UF-6143
B. E. II (Sem. III) Civil Examination
April / May - 2012
Fluid Mechanics - I

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

<p>नीचे दशांशिक निशानीवाणी विगतो उत्तरवही पर अवश्य लिखनी. Fillup strictly the details of signs on your answer book.</p> <p>Name of the Examination : B. E. 2 (Sem. 3) (Civil)</p> <p>Name of the Subject : Fluid Mechanics - 1</p> <p>Subject Code No. : 6 1 4 3 Section No. (1, 2,.....) : Nil</p>	<p>Seat No. : □ □ □ □ □ □</p> <p style="text-align: center; border: 1px solid black; border-radius: 15px; padding: 10px;">Student's Signature</p>
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- (2) Attempt all the questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever required.
- 1 (a) Differentials between broad crested, sharp crested and narrow crested weir. Explain submerged and unsubmerged weirs. 18
- (b) Explain normal acceleration and tangential acceleration. Draw stream lines for flow field of the following cases:
(i) no acceleration
(ii) convective tangential acceleration
(iii) convective normal acceleration.
- (c) Define one dimensional, two dimensional and three dimension flow; laminar and turbulent flow. Give examples of laminar and turbulent flow from practical life.
- 2 (a) Develop the relationship between shear stress gradient and pressure gradient in laminar flow for a two dimensional steady flow. 8
- OR**
- (a) Draw sketch of a partially submerged orifice and develop an expression for discharge for such an orifice.

- (b) Give the expression for head loss in terms of velocity for sudden contraction at a section. At a sudden enlargement of a pipeline from a diameter of 0.3 m to 0.6 metre the hydraulic gradient line rises by 0.13 metre. Estimate the discharge if the pipe is horizontal. 8
- 3 (a) Show that the point velocity for a steady laminar flow for a pipe varies with the square of radial distance from the centre. 8

OR

- (a) Draw sketch of a venturimeter to explain its working principle and state its salient features.
- (b) A pitot static tube having a coefficient of 0.98 is used to measure the velocity of water in pipe. The stagnation pressure record is 3 metre and the static pressure is 2 metre. What velocity does this indicate ? Explain working principle of pitot static tube. 8
- 4 (a) Explain viscosity with a neat sketch. Explain Newton's law of viscosity. Also explain variation of viscosity with temperature in case of liquids and gases. 9
- (b) Define fluid properties. Explain any three in detail. 9
- 5 (a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. 8
- (b) Calculate the pressure due to a column of 0.3 m of (i) water (ii) an oil of specific gravity 0.8 and (iii) mercury of specific gravity 13.6. Take density of water. $\delta = 1000 \text{ kg/m}^3$. 8

OR

- 5 (a) Describe in detail the various types of fluid flow. 8
- (b) A 30 cm diameter pipe, conveying water branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 8
- 6 Write short note on the following : (any four) 16
- (i) Capilarity and surface tension
- (ii) Real and Ideal fluid
- (iii) Local and convective acceleration
- (iv) Continuity equation
- (v) Relationship between pressures.