* U F - 8 0 5 5 *

UF-8055

B. E. - II (Sem. III) (Civil) Examination

May / June – 2012

Fluid Mechanics

(New Syllabus)

Time : **3** Hours] [Total Marks : **100**

Instructions : (1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 3) (CIVIL)

Name of the Subject :

☛ FLUID MECHANICS (NEW)

☛ Subject Code No. : 8 0 5 5 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Assume suitable data wherever necessary.
(3) Make neat sketches.
(4) Figures to the right indicate full marks.
(5) Attempt all the questions.

1 Answer any five : **20**

(a) Explain stability of floating body.

(b) What do you mean by exponential line and a line of constant stream function ? What is flow net ?

(c) State Pascal's law and derive it.

(d) Differentiate between Real fluid and Ideal fluid.

(e) Differentiate and explain absolute pressure, atmospheric pressure, gauge pressure and negative pressure.

(f) Explain viscosity, continuum, specific gravity and specific weight.

(g) Differentiate between surface tension and capillarity.

(h) Write classification of fluids.

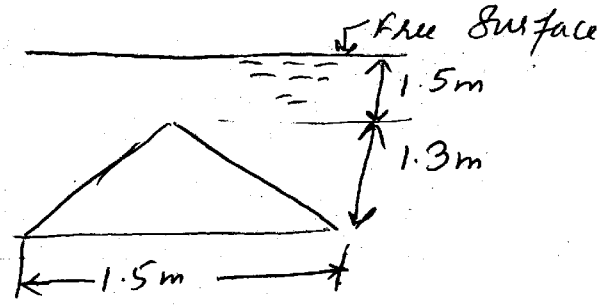
2 Answer the following :

(a) A liquid has specific gravity of 0.92, find its mass density, specific weight and specific volume. **5**

OR

(a) Two horizontal plates are 10 mm apart and the space between them is filled with oil of viscosity 1.5 N.S./m^2. Find the shear stress in the oil if the upper plate moves @ 3.0 m/s. **5**

(b) Find the total pressure and depth of the centre of pressure for triangular lamina as shown below. **7**



OR

(b) A rectangular plate 2m × 4m is immersed vertically in water such that the 2m side is parallel to the water surface. Determine the total pressure and centre of pressure if the upper edge of plate is horizontal and **7**

(i) Coincide with water surface

(ii) 2.5 m below the free surface.

(c) The velocity potential function (ϕ) is given by an expression **6**

$$\phi = \frac{-xy^3}{3} - x^2 + \frac{x^3 y}{3} + y^2$$

Find the velocity components in x and y direction and show that ϕ represent a possible case of flow.

OR

(c) Write the methods of plotting the flownet. What are the characteristics, application and limitations of flownet? **6**

3 Write short notes on any three : **12**

(a) Buoyancy

(b) U-tube manometer

(c) Vortex flow

(d) Doublet

(e) Continuity equation.

4 (a) Derive Euler's equation of motion for a fluid flow. **9**

(b) Water is flowing through a pipe having a diameter 300 mm and 200 mm at the bottom and upper and respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. **9**

5 (a) Find the expression for rate of flow through a venturimeter. Draw a neat sketch of a venturimeter. **8**

(b) A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of sp. gravity 0.8. The discharge of oil through venturimeter is 60 lit/s. Find the reading of oil mercury differential manometer. Take Cd = 0.98. **8**

OR

(a) For flow through pipe write Darcy Weisbach formula for loss of head in pipes explaining all the notations used. Also derive Chezy's formula for loss of head due to friction in pipes. **8**

(b) Find the head last due to friction in a pipe of diameter 300 mm and length 50 m through which water is flowing at a velocity of 3 m/s using **8**

(i) Darcy's formula

(ii) Chezy's formula

Take C = 60 and Re = 9×10^5.

6 Write short note on the following : (any four) **16**

(a) Assumption in Bernoulli's equation.

(b) Classification of Notches and weirs

(c) Mach Number

(d) Pitot tube

(e) Orifice.
