* K C - 6 1 4 3 *

KC-6143

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

November / December – 2012

Fluid Mechanics - 1

(Old 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 - 1 (OLD)

☛ Subject Code No. : 6 1 4 3 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Attempt all the questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data wherever required.

1 (a) State and explain the advantage of triangular weir over rectangular notch. **7**

(b) Draw a control volume and develop the relationship between pressure gradient and shear stress gradient for two dimensional steady uniform flow, viscous flow. **8**

2 (a) Describe the experiment conducted by Reynold to study the fluid flow in pipes and state its importance and limitations. **8**

(b) (1) State the Bernaulli's equation in a mathematical form. Explain the significance of each form state the conditions for the validity of the Bernaulli's equation. **8**

(2) Draw sketch to explain the working of pitot static and dynamic tube.

3 (a) A stream approaching a waterfall having a fall of 20m is gaged by a weir. The measured head over the weir is 0.32 m and the length of the weir is 3 metre. Determine the power available from the fall. Neglect the velocity of approach assuming 100% of energy can be used. **7**

(b) State the expression for point velocity distribution for laminar flow in pipes. Prove that the point where the local velocity is equal to mean velocity is at a radius of $r = 0.707$ times the radius of the pipe. **6**

OR

(b) Explain the working of a pipe bend meter. **6**

(c) Explain the importance of kinetic energy correction factor and why it is required **6**

OR

(c) Draw a sketch showing velocity gradient and shear stress variation in fluid to classify different types of fluids. **6**

4 (a) With neat sketch explain the condition of equilibrium for floating and submerged bodie's. **9**

(b) The space between two square flat parallel plates is filled with oil. Each side of the plate is 60cm. The thickness of the oil film is 12.5mm. The upper plate, which moves at 2.5 metre per sec. requires a force of 98.1N to maintain the speed determine : **9**

(i) Dynamic viscosity of the oil is poise and

(ii) The Kinematic viscosity of the oil in slopes if the specific gravity of oil is 0.95.

5 (a) Explain the phenomenon of capillarity and surface tension. Obtain expression for capillary rise and capillary fall. **8**

(b) Write the impression for surface tension on liquid droplet. **3**

(c) Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (a) water and (b) mercury. Take surface tension σ = 0.0725 N/m for water and σ = 0.52 N/m for mercury in contact with air. The specific gravity for mercury is given as 13.6 and angle of contact = 130°. **5**

OR

5 (a) Derive continuity equation in three dimensional form. **8**

(b) The velocity vector in a fluid flow is given as **8**

$V = 4x^3 i - 10x^2 yj + 21 - k$

Find the velocity and acceleration of a fluid particle at (2,1,3) at time t = 1.

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

(1) Meta centre and Meta centroic weight

(2) Velocity potential

(3) Flow net

(4) Types of flow

(5) Relationship between pressures.