B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Second Year)

CIVIL ENGINEERING

Paper - V : Fluid Mechanics

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   a)   State the hydrostatic law of pressure distribution.

b)   What is meant by metacentric height and its age?

c)   What is hydrostatic paradox?

d)   State the limitations of Bernoulli's equation.

e)   What is laminar sub-layer?

f)   Differentiate between convective and local acceleration giving two examples for each.

g)   What is pascal's law? Prove it?

h)   What are the advantages of venturimeter?

i)   State the chezy's formula for loss head due to friction in pipe.

j)   Define nominal thickness of boundary layer.

k)   Distinguish between pilot tube and pilot – static tube.

l)   What is syphon? Where is it used?

m)   Define total energy line.

n) What is meant by water hammer?

o) Explain one, two, three dimensional flows.

Unit – I

2) a) Explain the phenomen of cavitation.

b) A liquid with volume of 0.2 cubic meters at 300 kpa is subjected to a pressure of 3000 kpa and its volume is found to decrease by 0.2%. Calculate the bulk modulus of elasticity of the liquid.

OR

3) a) Explain any method of determination of meta centric height.

b) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4m and altitude 4 m when it is immersed vertically in an oil of sp. gr 0.9. The base of the plate coincides with the free surface of the oil.

Unit – II

4) a) Derive Bernoulli's equation from first principles indicating the assumptions made at the appropriate stage of the derivation.

b) The diameter of a tapering inclined pipe changes uniformly from 30 cm to 45 cm. The smaller end is 30 m above the larger. Water flows from the smaller end at a rate of 125 lps. The loss of head due to friction is 20% of the velocity head at the entrance. If the pressure at the entrance is 1.4 kg/cm^2 find the pressure at the exit.

OR

5) a) What is the need for momentum and energy correction factors? Derive the expression for that factors.

b) An orificemeter with orifice diameter 20cm is inserted in pipe of 30 cm diameter. The pressure difference measured by a mercury differential manometer on the two side of the orificemeter shows a value of 50 cm of mercury. Find the discharge of an oil flowing in the pipeline whose specific gravity is 0.8. Take $C_d = 0.65$.

Unit – III

6) a) Derive the expression for discharge through rectangular notch.

b) Describe the boundary layer growth over a flat plate

OR

7) a) Derive an expression to find the discharge through an external cylindrical mouth piece.

b) Water is flowing over a rectangular sharp erested weit of 2 m long, the head over the sill of weir is 0.80m. The approach channel is 2.6 m wide and the depth of flow in the channel is 1.7 m. Take coefficient of discharge as 0.62. Determine the discharge considering the end contractions and velocity of approach.

Unit – IV

8) a) Obtain an expression with a neat sketch for hydraulic gradient line and total energy line.

b) Enumerate the distinguish characteristics of laminar and turbulent flow.

OR

9) a) Find the discharge through a 50 mm pipe which draws water from a reservoir and delivers into atmosphere. The level of water in the reservoir above the open end of the pipe is 10 m. Length of the pipe is 500 m and friction factor = 0.03.

b) Distinguish between hydrodynamically smooth and rough boundaries.

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