(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2295022   Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech

Regular Theory Examination (Odd Sem -V), 2016-17

FLUID MECHANICS

Time : 3 Hours   ***Max. Marks : 100***

Note :   Attempt **all** Section. If require any missing data; then choose suitably.

SECTION - A

1.   Attempt **all** question in breif.   **(2×10=20)**

a)   What will the internal diameter of a glass tube if capillary rise of water in it is not to exceed 2mm?

b)   Define Floating body.

c)   What is Flow net?

d)   Discuss about Euler's Equation of Motion.

e)   Define Vena Contracta.

f)   What do you understand Notches and weirs?

g)   Draw the figure of Redwood viscometer.

h)   Define Reynolds's stresses with equation .

i)   What do you understand for Dimensionless numbers?

j)   Define Hydraulically smooth and rough boundaries.

SECTION - B

2.   Attempt any **three** of the following :   **(10×3=30)**

a.   Differentiate between : Dynamic and Kinematic Viscosity. Derive Newton's law of viscosity.

b.   An oil of specific gravity 09 and viscosity 10 poise is flowing through a pipe of diameter 110mm. The velocity at the centre is 2 mtr .Find the pressure gradient in the direction of Flow and shear stress at the Pipe wall.

c.   Prove that for viscous flow through a circular pipe, the kinetic energy correction factor β =4/3.

d.   A pipe carrying 0.05 cumecs of water suddenly contracts from 20cm to 15cm diameter. Calculate the coefficient of contraction if the loss of head is 0.5mtr.

e.   Explain the terms: Distorted Model and undistorted models. What are the uses of Distorted Model?

SECTION - C

3.   Attempt any **one** part of the following :   **(10×1=10)**

a.   Prove that centre of pressure is always below the centre of gravity for inclined plane surfaces.

b.   A wooden cylinder specific gravity 0.6 and circular in cross section is required to float in oil sp. Gravity 0.8. Find the H/D ratio for the cylinder to float with

its Longitudinal axis vertical in oil , where H is the height of cylinder and D is its diameter.

4. Attempt any **one** part of the following : **(10×1=10)**

a. Derive the expression for the path travel by free jet out of a nozzle.

b. A closed cylindrical vessel 160 mm of internal diameter and 1 mtr high contains water up to a height of 750 mm from the bottom. Find height of Paraboloid if the vessel is rotated at 450 rpm about its axis.

5. Attempt any **one** part of the following: **(10×1=10)**

a. For a Laminar flow in a circular pipe, Find the distance from the boundary where the local velocity equals the average velocity.

b. What is eddy viscosity ? write the equation for shear stress in turbulent flow in terms of velocity gradient.

6. Attempt any **one** part of the following : **(10×1=10)**

a. At a sudden enlargement of water pipe line from a diameter of 24cm to 48 cm , the hydraulics line rises by 1 cm . Estimate the flow rate in Pipe.

b. Drive an expression for equivalent Pipe.

7. Attempt any **one** part of the following : **(10×1=10)**

a. State Buckingham's π - theorem. What are repeating variables? How are these selected in dimensional anaysis?

b. What are similarity Laws? What is their importance in model Testing? Elaborate giving examples in each case.

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