## B. TECH.
## (SEM V) THEORY EXAMINATION 2018-19
## FLUID MECHANICS

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

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

### SECTION A

1.      **Attempt *all* questions in brief.**                    **2 x 10 =20**

   a.    Define Floating body.
   b.    Discuss about Euler's Equation of Motion.
   c.    What do you understand Notches and weirs?
   d.    Draw the figure of Redwood viscometer.
   e.    Define Reynolds's stresses with equation.
   f.    What is the difference between Pitot tube and Pitot static tube?
   g.    What will the internal diameter of a glass tube if capillary rise of water in it is not to exceed 2mm?
   h.    What do you understand Notches and weirs?
   i.    What is Flow net?
   j.    Define Hydraulically smooth and rough boundaries.

### SECTION B

2.      **Attempt any *three* of the following:**                    **10 x 3 = 30**

   a.    Differentiate between: Dynamic and Kinematic Viscosity. Derive Newton's law of viscosity.
   b.    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.
   c.    A square plate 2m diameter is immersed in water such that its maximum and the least depth below the free water surface are 2 m and 1 m respectively. Find the total hydrostatic pressure on one face of the plate and position of the center of pressure.
   d.    State the momentum equation. How it is used in determining the force exerted by a flowing liquid on a pipe bend.
   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:**                    **10x 1 =10**

   (a)    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.
   (b)    Prove that center of pressure is always below the center of gravity for inclined plane surfaces.

4. **Attempt any *one* part of the following:**                          **10 x 1 =10**

    (a) An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20cm diameter. The pressure fitted upstream and downstream of the orifice diameter gives reading of $19.62N/cm^2$ and $9.81$ $N/cm^2$respectively. Coefficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.

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

5. **Attempt any *one* part of the following:**                          **10 x 1 =10**

    (a) What is the intensity of turbuelence? Give equation of for turbulent Flow.

    (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:**                          **10x 1 =10**

    (a) Write the working principle of Hot-wire animator.

    (b) 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.

7. **Attempt any *one* part of the following:**                          **10 x 1 =10**

    (a) Show that the resistance F to the motion of a sphere of diameter D moving with a uniform velocity through a real fluid of density $\rho$ and viscosity $\mu$ is given by

    *$F=\rho D^2$ $V^2$ $f(\mu/VD\rho)$*

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