SF/sem III / Civil / NEP-2020 / NOV - DEC 2025   Date: 19/12/25

Q.P. code: 98340

Duration: 2hours   **Total marks: 60**

Q.1 is COMPULSORY
Attempt any THREE out of remaining questions
Assume suitable data wherever required.

Q.1 Attempt **any THREE** of the following   **(15)**
   A. Define the following: Density, Weight density, Specific volume, specific gravity, viscosity.
   B. What are the different pressure systems and relationship between them?
   C. Enlist different types of fluid flow and explain Continuity equation.
   D. Explain different hydraulic coefficients of orifices.
   E. Explain with a neat diagram HGL & TEL.
   F. What is Prandtl's mixing theory for turbulent shear stress.

Q.2.A. A circular plate 3.0m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 4m and 1.5m respectively. Determine the total pressure on one face of the plate and position of the centre of pressure.   **(08)**
Q.2.B. Explain the experimental method of determination of meta-centric height.   **(07)**

Q.3.A. A fluid flow field is given by
     $V = x^2yi + y^2zj - (2xyz + yz^2)k$
     Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point (2 ,1, 3)   **(08)**
Q.3.B. The water is flowing through a taper pipe of length 100m having diameters 600mm at the upper end and 300mm at the lower end, at the rate of 50lps. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2. **(07)**

Q.4. A. A horizontal venturi meter with inlet and throat diameters 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20cm of mercury. Determine the rate of flow. Take coefficient of discharge = 0.98.   **(08)**
Q4.B. The head of water over a rectangular notch is 900mm. The discharge is 300lps. Find the length of the notch, when $C_d = 0.62$ **(07)**

Q5. A. An oil of specific gravity 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200mm at rate of 60lps. Find the head lost due to friction for a 500m length of pipe. Find the power required to maintain this flow.   **(05)**
   B. Derive Dupuit's equation for equivalent pipe.   **(05)**
   C. What are the different losses of energy in pipes?   **(05)**

Q.6. A. Prove that ratio of maximum velocity to average velocity is 2, for laminar flow. **(05)**
   B. Explain water hammer in pipes.   **(05)**
   C. Find out the minimum size of the glass tube that can be used to measure the water level if the capillary rise in the tube is to be restricted to 2mm. Consider surface tension of water in contact with air as 0.073575 N/m.   **(05)**

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