

314303

24225

3 Hours / 70 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following :** **10**
- a) State Newton's law of viscosity along with its equation.
 - b) Define Atmospheric pressure and Gauge pressure and state the relation between them.
 - c) State two applications of pressure diagram.
 - d) Define Total Pressure and Centre of Pressure.
 - e) Define discharge and state its unit.
 - f) Define HGL and TEL.
 - g) List four components of centrifugal pump.

P.T.O.

2. Attempt any THREE of the following : 12

- a) 100 litres of liquid weighs 840N. Calculate its specific weight, mass density specific gravity and specific volume.
- b) Classify the pressure measuring devices.
- c) Discuss the applications of Hydraulics in the field of Irrigation Engineering and Water Supply Engineering.
- d) Explain the working of Differential U-Tube manometer with the help of a neat sketch.

3. Attempt any THREE of the following : 12

- a) Explain the variation of pressure with depth in horizontal and vertical direction with the help of a neat sketch.
- b) State equations to determine the Total pressure and Centre of pressure when the surface is
 - i) Horizontally immersed in liquid
 - ii) Vertically immersed in liquid
 - iii) When the surface is inclined or making some angle- θ with free liquid surface.
- c) Calculate the total pressure and centre of pressure for a circular plate of diameter 3.5m immersed. Fully and vertically in water. The centre of the plate is 5m below the free surface and it is immersed.
- d) A square tank of each side equal to 3m and height 2.5m. is filled with a liquid of specific gravity 0.85 upto a height of 2.25m. Determine the total pressure on the base and its position, with the help of neat sketch.

4. Attempt any THREE of the following : 12

- a) Define Laminar and Turbulent flow, steady and unsteady flow.
- b) Explain various heads of centrifugal pump with the help of a neat sketch.
- c) Explain the concept of Equivalent Pipe and state the equation to determine the diameter of equivalent pipe.
- d) Define the following:
 - i) Wetted Area
 - ii) Wetted Perimeter
 - iii) Hydraulic Radius and state the relation between them
- e) Define Most Economical Channel Section and state conditions for most economical trapezoidal section.

5. Attempt any TWO of the following : 12

- a) A horizontal pipe carrying water tapers from 30 cm diameter at A to 15 cm diameter at B. The pressure at A is 100 N/cm^2 . If the discharge is 10 litre per second, calculate the pressure at B in N/cm^2 if the loss of head is 10 cm of water.
- b) A pipeline 60 cm diameter bifurcates into two branches 40 cm and 30 cm diameter. If the discharge in main pipe is $1.5 \text{ m}^3/\text{s}$ and velocity of flow in 30 cm diameter pipe is 7.5 m/s , determine the discharge in 40 cm diameter pipe.
- c) Calculate the discharge over the given notches for a head of 20 cm :
 - i) Rectangular Notch ($L = 1.5 \text{ m}$, $C_d = 0.62$)
 - ii) Triangular Notch ($\theta = 45^\circ$, $C_d = 0.65$)

6. Attempt any TWO of the following :**12**

- a) Water discharges at a rate of $0.09 \text{ m}^3/\text{s}$ through a 10cm diameter vertical sharp edged orifice under a constant head of 8m. A point on the jet measured from vena contracta has co-ordinates 4.5m horizontal and 0.54m vertical. Calculate the co-efficients of the orifice.
 - b) Differentiate between centrifugal and reciprocating pump on the following points : type of discharge, suitability, efficiency, speed, construction and maintenance.
 - c) Two reservoirs are connected by a pipeline consisting of two pipes in series – one 10cm diameter and 5m long and the second pipe of 20cm diameter and 15m long. If the difference in water level in the two reservoirs is 8m, calculate discharge.
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