

314303

12526

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) Use of Non-programmable Electronic Pocket Calculator is permissible.
- (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
- (8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

- 1. Attempt any FIVE of the following :** **10**
- a) State Pascal's law of fluid pressure.
- b) Define – Viscosity, Capillarity.
- c) Define – Hydrostatic pressure, intensity of pressure.
- d) Define pressure head and give its unit.
- e) State the equation of continuity of flow.
- f) Give meaning :- Hydraulic Gradient Line (HGL) and Total Energy Line (TEL).
- g) Enlist any two discharge measuring devices.

P.T.O.

- 2. Attempt any THREE of the following :** **12**
- a) Explain any four applications of hydraulics in civil engineering.
 - b) Draw the sketches for the following –
 - i) Simple U tube manometer
 - ii) Differential U tube manometer.
 - c) Explain surface tension with suitable sketches.
 - d) An oil of specific gravity 0.85 is flowing through a pipe. A simple manometer is connected to the pipe containing mercury. The deflection of mercury level in left limb from centre of pipe is 50 mm. Whereas right limb (from centre of pipe) it is 80 mm. Calculate pressure in KPa.
- 3. Attempt any THREE of the following :** **12**
- a) Explain that the centre of pressure of any lamina immersed in fluid is always below its centroid.
 - b) Explain with sketch variation of pressure in horizontal and vertical direction in static fluid.
 - c) Explain the concept of pressure diagram with neat sketches. Give two applications of pressure diagram.
 - d) An isosceles triangular plate of base 5 m. and height 5 m. is immersed vertically in an oil of specific gravity 0.9. The base of triangular plate is touching the surface and the plate is immersed with apex in downward position. Find the total pressure and centre of pressure of the plate.
- 4. Attempt any THREE of the following :** **12**
- a) State and explain Bernoulli's theorem with any two practical applications of it.
 - b) Distinguish between reciprocating pump and centrifugal pump.
 - c) Explain the major and minor losses in pipe with expression.
 - d) Explain the most economical channel section. State the conditions for rectangular channel to be most economical.
 - e) Define - Wetted area, Wetted Perimeter, Hydraulic radius, Notches.

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

- a) Calculate loss of head and direction of flow for pipe 400 meter long having slope of 1 in 200. It tapers from 1.8m. diameter to 0.8m. diameter. at lower end. Discharge of water flowing through pipe is 800 lit./sec. Pressure at higher end is 8 N/cm^2 and at lower end 15 N/cm^2 .
- b) A pipe of 10 cm. diameter branches into two pipes of 5 cm. and 2 cm. diameter. The flow in 5 cm. dia. branch is $\frac{2}{3}$ of the flow in main pipe of 10 cm. dia. The remaining flow passes through 2cm. dia. pipe. If the average velocity of flow in pipe doesn't exceed 2m/s find the rate of flow in the main pipe.
- c) Design a trapezoidal most economical channel section having sides slopes 1.5H : IV. It is required to discharge of $30 \text{ m}^3/\text{sec}$ with a bed slope of 1:6000. Design section using Manning's formula. Take $N = 0.018$.

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

- a) Find power required for pump under following condition :
 - i) Water to be pumped = 80 lit/sec
 - ii) Total lift = 25 meter
 - iii) Frictional loss = 4 meter
 - iv) Efficiency of pump = 75%.
 - b) Two reservoirs are connected by a pipe line consisting of two pipes one of 20 cm. dia. and length 5 m. and other 25 cm. dia. and 20 m. length. If the difference of water level in two reservoirs is 10 m. Calculate discharge.
 - c) Explain construction and working of venturimeter with neat sketch.
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