

22401

21222

3 Hours / 70 Marks

Seat No.

--	--	--	--	--	--	--	--

15 minutes extra for each hour

- 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.

Marks

- 1. Attempt any FIVE of the following: **10****
- a) State Pascal's law of fluid pressure.
 - b) Draw pressure diagram for inclined immersed surface.
 - c) Define uniform flow and non-uniform flow.
 - d) Write the use of Moody's Diagram.
 - e) Define hydraulic coefficients of orifice.
 - f) State the principle of working of Pitot tube.
 - g) Define static head and manometric head of centrifugal pump.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Define capillarity. Derive an expression for capillary rise.
 - b) U tube differential mercury manometer is connected to horizontal pipe carrying water at two points A and B. The difference in levels of mercury in the two limbs is 0.35 m. Calculate pressure difference at A and B in kN/m^2 .
 - c) An isosceles triangular plate of base 4 m and height 4 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 on the plate.
 - d) Define total hydrostatic pressure and centre of pressure. Mention two applications of it.
- 3. Attempt any THREE of the following:** **12**
- a) A partition wall 2 m long divides a storage tank. On one side there is turpentine of specific gravity 0.87 upto a depth of 3 m. On the other side there is paraffin oil of specific gravity 0.82 stored to a depth of 2 m. Determine the resultant pressure on partition wall and the position of it.
 - b) Explain simple U tube manometer with a neat sketch.
 - c) Calculate the specific weight, density, specific volume and specific gravity of 1.5 litres of fluid which weighs 6 N.
 - d) Water flows with velocity 2 m/s through a pipeline which gradually reduces from 450 mm diameter at A to 300 mm diameter at B and then from B branches into 2 pipes. One branch being 150 mm diameter discharging at C and the other branch 225 mm diameter discharging at D. If the velocity at D is 4 m/s. What will be the discharge at C and D.

4. Attempt any THREE of the following. 12

- a) State Bernoulli's theorem. Write the limitations of Bernoulli's theorem.
- b) Determine the diameter of uniform pipe to replace a compound pipeline having 50cm diameter pipe for 1500m length. 40cm diameter pipe for 1000m length and 35cm diameter pipe for 1200m length. The total length of uniform pipe should remain the same.
- c) Differentiate between triangular notch and rectangular notch.
- d) A rectangular channel carries water at the rate of 500litres/sec when bed slope is 1 in 3000. Find the most economical dimension of the channel if $C = 60$.
- e) Calculate the power required for the pump with following data.

Static lift = 20m

Length of delivery pipe = 50m

Head lost in suction pipe = 1m

Diameter of delivery pipe = 10cm

f for delivery pipe = 0.04

$Q = 20$ lit/sec.

$\eta = 70\%$

5. Attempt any TWO of the following: 12

- a) Explain the main component parts of centrifugal pump with neat sketch.
- b) A horizontal pipeline 50m long starts from a reservoir. The head above inlet is 8m. The pipeline discharges freely at the other end. The diameter of first 25m length is 15cm. and for remaining length is 30cm. Calculate the discharge through pipeline taking $F = 0.04$ for both the lengths of the pipe.

- c) A sloping pipe line has diameter of 1 m at higher end and 50 cm at lower end. It carries liquid at specific gravity 0.75 at 4800 lpm. The length of pipe is 350 m and it is laid on slope of 1 in 100. The pressure at lower end is 1200 KN/m^2 . Determine pressure at higher end.

6. Attempt any TWO of the following:

12

- a) Water discharges at the rate of $0.0982 \text{ m}^3/\text{sec}$. through a 12 cm diameter vertical sharp edges orifice placed under a constant head of 10 m. A point on the jet measured from vena contracta of the jet has co-ordinates 4.5 m horizontal and 0.54 m vertical. Find the coefficients C_c , C_d and C_v of the orifice.
- b) Explain working of cup type of current meter with a neat sketch.
- c) Design a section of an unlined channel to carry a discharge of $6 \text{ m}^3/\text{sec}$. with a bed slope of 1 in 3600 and side slope 1.5H to IV. The average velocity of flow is not to exceed 0.667 m/s . Take Manning's $N = 0.025$.
-