

17452

15162

3 Hours / 100 Marks

Seat No.

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

- Instructions :** (1) All Questions are *compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Solve any TEN of the following :

2 × 10 = 20

- (a) Define and classify fluid.
- (b) Enlist two uses of hydraulics in irrigation.
- (c) State 'Pascal law'.
- (d) Define 'Hydrostatic Law'.
- (e) Explain the working principle of piezometer.
- (f) How will you measure negative pressure ?
- (g) Enlist any four types of flows.
- (h) Enlist two uses of Reynold's number.
- (i) What is meant by loss of head in flow through pipes ?
- (j) State the conditions for most economical channel sections :
 - (i) Rectangular section
 - (ii) Trapezoidal section
- (k) Define pumps. How pumps are classified ?
- (l) Define Reciprocating pumps.
- (m) Express the equation for the overall efficiency of pump.
- (n) Give in detail classification of weir.

2. Solve any FOUR of the following :**4 × 4 = 16**

(a) Define :

- (i) Mass density
- (ii) Weight density
- (iii) Specific volume
- (iv) Specific gravity

State its units.

(b) If 5 m³ of a liquid weighs 45 kN, determine its specific weight, specific mass and specific gravity.

(c) Explain :

- (i) Atmospheric pressure
- (ii) Gauge pressure
- (iii) Negative pressure
- (iv) Absolute pressure

(d) Explain with neat sketch the working of Bourdon's Gauge.

(e) Differentiate between simple manometer and differential manometer.

(f) What is capillarity ? Give expression for capillary rise and state the meaning of each term.

3. Solve any FOUR of the following :**4 × 4 = 16**

(a) State and explain the 'equation of continuity' of flow.

(b) (i) State Bernoulli's equation.

(ii) State the practical applications of Bernoulli's theorem.

(c) A pipeline changes in size from 20 cm diameter at 'A' to 60 cm diameter at 'B' and used to carry oil of specific gravity 0.8. Point 'A' is 6 m lower than point 'B' and pressure at 'A' and 'B' are 80 kN/m² and 60 kN/m² respectively. If the discharge is 200 lit/sec, find the loss of head and direction of flow.

(d) Define notches and give its classification.

- (e) (i) Define :
- (1) orifice
 - (2) co-efficient of contraction
 - (3) co-efficient of velocity
 - (4) co-efficient of discharge
- (ii) State the co-relation between CC, C_v & C_d .
- (f) A venturimeter having 30 cm diameter at inlet and 10 cm diameter at throat carries water. The difference in mercury levels in U-tube differential manometer is 6 cm. The venturimeter is horizontal. Taking C_d (co-efficient of discharge) as 0.98. Calculate discharge.

4. Solve any FOUR of the following :

4 × 4 = 16

- (a) Enlist various types of losses during fluid flow through pipe and explain any one detail with mathematical equations.
- (b) Explain in detail siphon and give any two uses of siphon.
- (c) At a sudden enlargement of a water from 240 mm to 480 mm diameter pipe; hydraulic gradient rises by 10 mm. Estimate the rate of flow.
- (d) Define :
 - (i) Depth of flow
 - (ii) Wetted area
 - (iii) Wetted perimeter
 - (iv) Hydraulic mean depth
- (e) Explain with neat sketch the most economical section of channel.
- (f) Find the sectional dimensions of a rectangular channel if best section to convey a discharge of 2-50 cumecs; if the bed slope is 0.00012. Take mannings constant $N = 0.015$.

5. Solve any FOUR of the following :

4 × 4 = 16

- (a) Explain Froude's Number and give its significance.
- (b) Define and give situation, uses of hydraulic jump.

- (c) What is meant by 'Priming group' ? Why is it needed ?
- (d) Explain with neat sketch the working principle of double acting reciprocating pump.
- (e) Define :
 - (i) Suction head (h_s)
 - (ii) Delivery head (h_d)
 - (iii) Static head (H_s)
 - (iv) Manometric head (H_m)
- (f) Find the power required for a pump under the following condition :
 - (i) Water to be pumped = 5×10^6 lit/day
 - (ii) Pumping hours = 10 hours
 - (iii) Total lift = 20 m
 - (iv) Frictional losses = 5 m
 - (v) Efficiency of pump = 80%

6. Solve any FOUR of the following :

4 × 4 = 16

- (a) Explain with neat sketch construction and working of a centrifugal pump.
 - (b) Differentiate between centrifugal pump and reciprocating pump.
 - (c) Explain multistage pump system in detail.
 - (d) Explain the causes of vibration troubles and suggest remedies over it.
 - (e) Explain in detail turbines and classification of turbines.
 - (f) Explain in detail description and working of submersible pump.
-