

17421

21819

3 Hours / 100 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.

Marks

1. (A) Attempt any SIX :

12

- (a) State the importance of hydraulics with respect to environmental engineering.
- (b) What is the specific volume of material with specific gravity 0.90 ?
- (c) State the Pascal's law and it's practical applications.
- (d) Explain – mercury is used as a manometric liquid.
- (e) List four types of minor losses.
- (f) Write down remedial measures of water hammer.
- (g) Enlist types of flow.
- (h) State the hydraulic co-efficient of an orifice and write relation between them.

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P.T.O.

(B) Attempt any TWO :**8**

- (a) Explain any four physical properties of fluid.
- (b) A vertical tank square in plan has side width 4.5 m. It contains an oil of specific gravity 0.8 to a depth of 2.5 m. Calculate total pressure on bottom and on one side of tank.
- (c) Differentiate between Real fluid and Ideal fluid.

2. Attempt any FOUR :**16**

- (a) A circular plate 4 m dia is immersed in oil of specific gravity of 0.9 such that its greatest and least depth below the free surface of oil is 5 m and 2 m respectively.

Calculate :

- (i) The total pressure on one side or face of the plate.
- (ii) The location of centre of pressure
- (b) A circular plate 2.5 m dia immersed in water vertically 2.0 m below liquid surface. Find the centre of pressure and total pressure.
- (c) State the Pascal's law and give any two applications of it.
- (d) Explain the term :
 - (i) Atmospheric pressure
 - (ii) Absolute pressure
 - (iii) Gauge pressure by drawing line diagram
- (e) Convert pressure of 9 m of oil of specific gravity 0.92 into pressure head in 'm' of liquid having specific gravity 1.1.
- (f) State Bernoulli's theorem and its limitations.

3. Attempt any FOUR :

16

- (a) A horizontal pipe carrying water tappers from 25 cm dia at 'A' to 15 cm diameter at 'B' in a length of 2 m. The pressure at A is 100 N/cm^2 . If the discharge is $0.01 \text{ m}^3/\text{s}$, calculate pressure at B in N/cm^2 , if the loss of head from 'A' to 'B' is 10 cm.
- (b) Explain the hydraulic gradient line and total energy line with the help of neat sketch.
- (c) Water flows through a pipe line which gradually reduces from 500 mm diameter at 'A' to 400 mm diameter at 'B' and then forms, one branch being 150 mm diameter discharge at 'C' and other branch 200 mm diameter discharge at 'D' if velocity at 'D' is 5 m/s. What will be the discharge at 'C' and 'D', and the velocity at 'B' and 'C' ?
- (d) Three pipes having same length and same friction factor having different diameter as 300 mm, 150 mm, 50 mm respectively. When three pipes are connected parallel, gives a total discharge of $0.90 \text{ m}^3/\text{s}$. Find out discharge in each pipe.
- (e) Define following :
- | | |
|----------------------------|------------------------------|
| (i) Wetted perimeter | (ii) Wetted area |
| (iii) Hydraulic mean depth | (iv) Most economical channel |
- (f) Explain Moody's diagram and state its applications.

4. Attempt any FOUR :

16

- (a) Draw neat sketch of flow net showing streamlines and equipotential lines and state its uses.
- (b) Define Hydraulic jump and state its two applications.
- (c) Explain critical, sub-critical and super critical flow with reference to Froude's Number.
- (d) What is most economical channel section ? Write condition for rectangular channel section to be economical.

P.T.O.

- (e) Explain working of venturimeter with neat sketch.
- (f) A triangular notch of an angle 120° used to measure the discharge of pump. Determine the head over the notch, if discharge is 1000 lit/minute. Assume $C_d = 0.6$.

5. Attempt any FOUR :**16**

- (a) List the velocity measuring devices for channels and explain any one.
- (b) Determine discharge through 60° triangular notch in LPS under the head of 0.20 m. Take $C_d = 0.6$.
- (c) List any four components of centrifugal pump with their functions.
- (d) Explain the working of reciprocating pump with neat sketch.
- (e) Water flows over rectangular weir 6 m long under head of 1.5 m, calculate the discharge over the weir if $C_d = 0.6$.
- (f) Compare centrifugal pump and reciprocating pump on any four points.

6. Attempt any TWO :**16**

- (a) Explain with reason triangular notches are preferred than rectangular notches. Find the discharge over triangular notches of angle 60° when head over the notch is 15 cm. Take $C_d = 0.62$.
 - (b) Explain construction and working of Bourdon's pressure gauge with the help of neat sketch and write two advantages of it.
 - (c) The dia. of horizontal pipe suddenly changes from 30 cm to 35 cm. The discharge from the pipe is 300 lps. Calculate head loss when
 - (i) water flows from smaller dia. to large diameter pipe
 - (ii) flow is reversed with same discharge.
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