

# 17452

14115

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. Attempt any TEN :**

**20**

- Define (i) Hydrostatics (ii) Hydrodynamics.
- Differentiate between real fluid and ideal fluid.
- State Pascal's law of transmissibility.
- Differentiate between steady and unsteady flow.
- Give two practical application of Bernoulli's theorem.
- Define – Hydraulic gradient line.
- State meaning of Syphon pipe.
- Differentiate between Orifice and Mouth piece.
- Define the term-Hydraulic radius.
- State significance of Froude's number.
- State types of impeller in centrifugal pump.
- State purpose of priming of pump.
- State purpose of foot valve in pump.
- State meaning of negative slip.



**P.T.O.**

**2. Attempt any FOUR :****16**

- (a) Define following properties of fluid and state their SI units :
  - (i) Specific volume
  - (ii) Viscosity
- (b) State the meaning of following properties of fluid :
  - (i) Specific gravity
  - (ii) Compressibility
  - (iii) Surface tension
  - (iv) Adhesion
- (c) Calculate specific weight and specific gravity of one litre of liquid which weighs 7 N.
- (d) Explain Bourdon's tube pressure gauge with a neat sketch.
- (e) Explain hydraulic jack with a neat sketch.
- (f) A rectangular plate with base 2m and height 4m is immersed vertically in water with its top edge one metre below free water surface. Calculate total pressure on plate and centre of pressure.

**3. Attempt any FOUR :****16**

- (a) State meaning of atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
- (b) The right limb of U-tube manometer containing mercury is open to atmosphere. While left limb is connected to pipe in which fluid of specific gravity 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in right limb. Find pressure of fluid in pipe if difference of mercury level in two limbs is 20 cm.
- (c) The diameter of horizontal pipe at section A & B are 10 cm and 15 cm respectively. Find discharge through pipe if velocity of water flow at section A is 5 m/s. Determine the velocity of flow at section B.

- (d) A pipe of diameter 40 cm carries water at velocity of 25 m/sec. The pressure at points A & B are given as 29.43 N/cm<sup>2</sup> and 22.56 N/cm<sup>2</sup> respectively. While datum head at A & B are 28 m and 30 m respectively. Find loss of head between A & B.
- (e) A horizontal venturimeter with inlet and throat diameter 30 cm and 15 cm respectively is used to measure discharge. The reading of differential manometer connected to inlet and throat is 20 cm of mercury. Determine discharge. Take  $C_d = 0.98$ .
- (f) Explain pitot tube with its principle.

**4. Attempt any FOUR :**

**16**

- (a) Differentiate between notch and weir on any four points.
- (b) A jet of water from sharp edged vertical Orifice under a constant head of 100 cm at certain point has horizontal and vertical coordinates measured from vena-contractor as 20 cm and 10.5 cm respectively. Find value of  $C_v$  and  $C_c$  if  $C_d = 0.60$ .
- (c) Explain Moody's diagram and its use.
- (d) State four types of minor losses in pipe flow with their equation.
- (e) A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water level as 20 m. Calculate discharge through the pipe.  $\left( \text{Use formula } hf = \frac{fLv^2}{zgD} \right)$
- (f) An old water supply pipe of 25 cm diameter is to be replaced by two parallel pipes of equal diameter having equal length and same frictional factor. Find out diameter of new pipe.

**5. Attempt any FOUR :**

**16**

- (a) Explain causes and effects of water hammer in pipe.
- (b) Find slope of bed of rectangular channel of width 5 m when depth of water is 2 m and discharge as 20 m<sup>3</sup>/sec. Take manning's constant = 0.015.

- (c) Find discharge through trapezoidal channel of width 8 m and side slope 1 H : 3 V. The depth of flow of water is 2.4 m, and slope of bed of channel is 1 : 4000. Take Chezy's constant = 50.
- (d) A rectangular channel carries water at rate of 400 litre/.sec, when bed slope is 1 : 2000. Find most economical dimension of channel if  $c = 50$ .
- (e) Explain critical, sub-critical and super critical flow in channel with a neat sketch.
- (f) Explain phenomenon of hydraulic jump and state its uses.

**6. Attempt any FOUR :**

**16**

- (a) Explain volute casing with a neat sketch.
  - (b) Draw a layout of centrifugal pump with its accessories.
  - (c) State meaning of multistage centrifugal pump. Explain multistage centrifugal pump for high discharge.
  - (d) Explain working of single acting reciprocating pump with a neat sketch.
  - (e) Explain ideal indicator diagram for a reciprocating pump.
  - (f) Explain working of submersible pump.
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