

314303

25226

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.

Marks

1. Attempt any FIVE of the following : 10
- State two limitations of piezometer.
 - Define Total pressure and Centre of pressure.
 - Define Discharge and state its unit.
 - Write the Dupuit's equation for equivalent pipes.
 - Define Hydrostatics and write any two applications.
 - Define surface tension and state its unit.
 - Enlist any four component parts of centrifugal pump.

P.T.O.

- 2. Attempt any THREE of the following : 12**
- a) Explain atmospheric pressure. Write the value of atmospheric pressure in terms of water column and mercury column.
 - b) State four use of pressure diagram.
 - c) State the Bernoulli's theorem. Write the limitation of Bernoulli's theorem.
 - d) Explain the working of venturimeter with neat sketch.
- 3. Attempt any THREE of the following : 12**
- a) Explain why mercury is used as manometric liquid.
 - b) Explain the concept of pressure diagram with neat sketches for horizontal and vertical surfaces.
 - c) Explain Moody's diagram with its use.
 - d) State the condition for most economical channel section for
 - i) Rectangular section
 - ii) Trapezoidal section
- 4. Attempt any THREE of the following : 12**
- a) Explain the advantages of simple U tube manometer over a piezometer.
 - b) Explain Reynolds's number with its equation and give significance.
 - c) Differentiate Reciprocating pump with centrifugal pump.
 - d) Find the velocity of flow and rate of flow water through an open channel of 6m wide and 3m deep, when it is running full. The Channel is having bed slope as 1 in 2000. Take Chezy's constant $C = 55$.

e) Calculate the power of the pump from following data.

- i) Total Static lift = 25 m
- ii) Diameter of suction pipe = 12 cm
- iii) Diameter of delivery pipe = 10 cm
- iv) Length of suction pipe = 5 m
- v) Length of delivery pipe = 50 m
- vi) $F = 0.04$ for both pipes
- vii) $Q = 30$ lit/sec.
- viii) Efficiency = 75%.

5. Attempt any TWO of the following :

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- a) A pipe line of 60 cm diameter bifurcates into two branches 40 cm and 30 cm diameter. If the rate of flow in main pipe is $1.5 \text{ m}^3/\text{sec}$. and velocity of flow in 30 cm diameter pipe is 7.5 m/sec . Determine rate of flow in 40 cm diameter pipe.
- b) State the classification of minor losses in pipe with suitable sketches and equations for each.
- c) Determine the most economical section of a trapezoidal channel for carrying discharge $15 \text{ m}^3/\text{sec}$ with bed slope of 1:4500, The side slopes are 4H:3V. Take Manning's constant 0.015.

6. Attempt any TWO of the following :

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- a) A 'U' tube differential mercury manometer connected two points of horizontal pipe carrying liquid of sp.gr, 0.8, shows differential reading of 20 cm. Find pressure difference between two points in term of N/m^2 .
- b) A concrete dam 15 m deep and 2 m wide containing water to a depth of 10 m. Find total hydrostatic pressure per meter run and centre of pressure on upstream face,

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Marks

- c) A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into atmosphere at the other end. For the first 25 m of its length, the pipe is 0.15 m diameter and suddenly changed to 0.3 m. The height of water level in the tank is 8 m above the centre of the pipe. Consider all the losses and determine the rate of flow. The velocity of water in pipe-1 (V_1) = 4.452 m/s and pipe-2 (V_2) 1.113 m/s. Take $f = 0.01$.
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