22401

12425

03 Hours / 70 Marks Seat No. | | | | | | | | |

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) Define Dynamic viscosity and Kinematic Viscosity.

b) State the importance of hydraulics with respect to environmental engineering.

c) Define total pressure and centre of pressure with its unit.

d) Define Reynold's Number.

e) Define Hydraulic gradient line and total energy line.

f) Define Datum head and pressure head and give its unit.

g) State the use of Moody's Diagram.

Marks

2. Attempt any THREE of the following : **12**

a) Explain with neat sketch the working of Bourdon's tube pressure gauge.

b) A liquid weight 25 KN and occupies 3.75 m^3, find its specific weight, Mass density, specific volume and specific gravity.

c) Explain the concept and use of pressure diagram with neat sketches.

d) Explain the following with neat sketches.

i) Simple manometer and its types.

ii) Differential manometer and its types.

3. Attempt any THREE of the following : **12**

a) A circular plate of 4 m diameter is immersed in water such that its greatest and least depth below the free surface of water are 6 m and 4 m respectively calculate –

i) Total pressure on one face of the plate.

ii) The position of centre of pressure.

b) State and explain Bernoullis theorem with any two practical application of it.

c) Explain critical, sub critical and supercritical flow with reference to Froude's Number.

d) A partition wall 2 m long divides a storage tank on one side there is liquid with specific gravity 0.87 upto a depth of 1.5 m on the other side there is another liquid with specific gravity 0.80 stored to a depth of 1 m. Determine the resultant pressure on the partition wall and the position of at which it acts.

Marks

4. Attempt any THREE of the following : **12**

a) List the velocity measuring devices for channel and explain any one.

b) Explain the working of Reciprocating pump with neat sketch.

c) A centrifugal pump is required to pump 15 lit/sec against head of 32 m. Find the power required by the pump taking overall efficiency 75%.

d) Explain with sketch types of flow.

e) List any four components of centrifugal pump with their functions.

5. Attempt any TWO of the following : **12**

a) A conical pipe has diameter 40 cm at the larger end and 20 cm at the smaller end and forms a part of a vertical main. The pressure head at the larger end is found to be 30 m and the smaller end 22 m of water. Find the discharge through the pipe, if the length of conical portion is 2 m. Assuming no losses and the larger is at the top.

b) An oil of specific gravity 0.8 flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take Cd = 0.98.

c) Water discharge at the rate of 0.09 m^3/sec through 10 cm diameter vertical sharp edged orifice placed under a constant head of 8 m. A point on the jet measured from Vena contract 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 orifice.

Marks

6. Attempt any TWO of the following : **12**

a) State the classification of losses in pipe with suitable sketches and equations for each.

b) A triangular notch of angle 120° is used to measure the discharge. Determine the head over the notch, if discharge is 1500 lits/minute. Assume $C_d = 0.6$.

c) Determine the most economical section of a trapezoidal channel for carrying discharge 15 m^3/sec with bed slope of 1:4500. The side slopes are 4H:3V. Take Manning's constant 0.015.