22401

24225

3 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 weight density and mass density and give its unit.

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

c) Define Continuity equation.

d) Express 7.8 m of water in N/m^2

e) Define hydraulic gradient line and total energy line.

f) State the condition for most economical rectangular channel section.

g) Define suction head and delivery head.

P.T.O.

Marks

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

a) Determine the specific gravity of a fluid having viscosity 0.05 poise and kinematic viscosity 0.035 stokes.

b) A simple U-tube manometer is used to measure water pressure in pipe. The left limb of manometer is connected to pipe and right limb is open to atmosphere. The mercury level in left limb is 120 mm below the centre of pipe and in right limb 80 mm above the centre of pipe. Calculate the water pressure in pipe.

c) A circular plate of 4 m diameter is immersed in water such that it's greatest and least depth below the free surface of water are 5m & 3m respectively,

calculate

i) Total pressure on one face of plate

ii) The position of centre of pressure.

d) Explain with a neat sketch the working of Bourdons pressure gauge.

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

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

b) 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 at which it acts.

c) A pipeline carry oil of sp.gr 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 m at a higher level. If the pressure at 'A' and 'B' are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 lit/sec. Determine the loss of head and direction of flow.

d) Define:

i) Laminar flow and turbulent flow.

ii) Steady and Unsteady flow.

Marks

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

a) Explain Reynolds number with its significance and applications of Reynolds number.

b) Water flows through a horizontal tapering pipe with a diameter of 30 cm at one end and 20cm at the other end. If the velocity of water at the larger end is 2.5 m/sec. Find the velocity and the discharge at the smaller end.

c) A compound pipe having following sections, 45 cm diameter for 100 m, 30 cm dia. for 750 m and 15 cm dia. for 500 m is required to replace by a pipe of uniform diameter. Find the diameter of new pipe assuming length to remain the same.

d) A venturimeter 30 cm diameter at entrance to 10 cm diameter at throat connected to pipe flowing water. The difference in mercury level of manometer is 6 cm. Calculate the discharge flowing through the pipe.

e) Explain minor loss of head in flow through pipes with their expression.

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

a) Water discharge at the rate of 0.09 m3/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 contracta of the jet has co-ordinates 4.5 m horizontal and 0.54 m vertical. Find the coefficients Cc, Cd and Cv of the orifice.

b) Design a trapezoidal most economical channel section having side slopes 1.5 H: IV. it is required to discharge of 20 m3/sec. With a bed slope of 1:6000. Design section using Manning's formula; Take N = 0.015.

c) Draw a neat sketch of cup type current meter and explain its working.

Marks

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

a) 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 Cd = 0.6

b) Calculate the power required for the pump with following data.

i) Static lift = 20 m

ii) Length of delivery pipe = 50 m

iii) Head lost in suction pipe = 1 m

iv) Diameter of delivery pipe = 10 cm

v) f for delivery pipe = 0.04

vi) Q = 20 lit/sec.

vii) η = 70%

c) Explain with neat sketch working of the centrifugal pump.
