22401

12526

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 answer with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) 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) State any four applications of Hydraulics in Civil Engineering.

b) State the concept of pressure diagram.

c) State the difference between Hydrostatic and Hydrodynamic.

d) State the modified Bernouli's equation.

e) Write the classification of losses.

f) Define most economical channel section.

g) Define the term priming of centrifugal pump.

Marks

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

a) Draw neat labelled sketch of Bourdon's tube pressure gauge.

b) An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is flowing. The vertical distance between the axis of these pipes is 25 cm. Manometric liquid is an oil of specific gravity 0.85. The vertical height of water column in the limbs of inverted manometer (when measured from respective centre of pipe) is found to be same and equal to 30 cm. As shown in Figure No. 1.

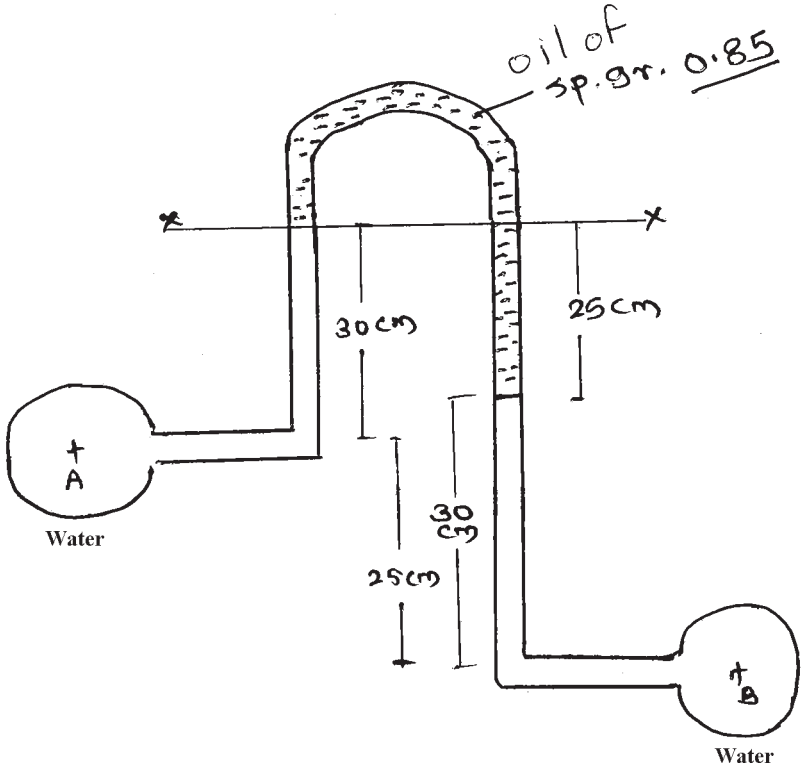

Fig. No. 1

c) State the meaning of Water Hammer and write its effect.

d) An isosceles triangular plate of 3 m base and 3 m height is immersed vertically in water such that its base is at a dept of 3 m from the free water surface. The apex of the plate is below the base of the plate. Determine the total pressure and position of centre of pressure.

Marks

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

a) State and explain the continuity equation of flow.

b) A partition wall 3.5 m long divides a storage tank. On one side, there is petrol of specific gravity 0.75 stored to depth of 1.8 m, while on the other side, there is an oil of specific gravity 0.85 stored to a depth of 0.9. Determine the resultant pressure acting on the partition wall.

c) Define the term Hydraulic Jump and write it's uses.

d) Calculate the power required for pump to lift water under following condition :–

i) Suction lift = 4 mt.

ii) Delivery head = 22 mt.

iii) Losses in the system = 5.5 mt.

iv) Discharge of pump = 50 lit/sec.

v) Efficiency of pump = 92%.

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

a) Determine the most economical section of trapezoidal channel for carrying 14 m^3/sec with bed slope 1:5000. The side scope are 3H:2V. Take Manning's constant 0.013.

b) Draw neat labelled sketch of centrifugal pump.

c) Water flows through pipeline which gradually reduces from 550 mm diameter at 'A' to 300 mm diameter at 'B' and then forks, one branch being 200 mm diameter discharge at 'C' and the other branch 250 mm diameter discharging at 'D'. If the velocity at D is 4 m/s. What will be the discharges at 'C' and 'D' and the velocity at 'B' and 'C'? If the velocity at A = 2 m/s.

d) Explain the phenomenon of Syphonic Action.

e) State the Pascal's Law of fluid pressure and write its uses.

Marks

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

a) A circular plate of diameter 2 meter as shown in Figure No. 2. The plate is immersed in water at an angle 40° to the horizontal and the top edge of the plate is 1 m below the free water surface. Find the total pressure on the plate and the depth of centre of pressure. As shown in Figure No. 2.

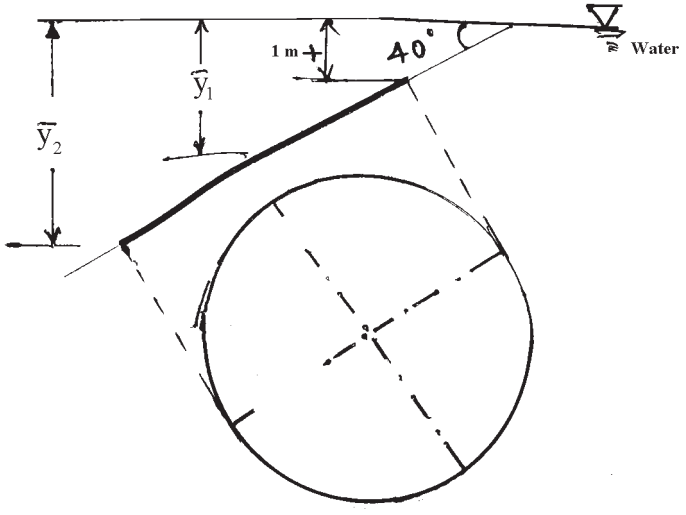

Fig. No. 2

b) State the Law of fluid friction. Also write the friction factor and factor affecting friction factor.

c) Enlist velocity measuring devices and state the working of any one device.

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

a) Define the various types of flow.

b) Water is supplied to a town of 5 lakhs inhabitants from reservoir 6.5 km away from the town. The loss of head due to friction in pipeline is measured as 15 m. Calculate the size of supply main if each inhabitant consumes 190 litres of water per day and half of daily supply is pumped in 8 hours. Take F =0.03.

c) A trapezoidal channel of most economical section has side slope 3 H : 4V and bed slope 0.5 in 3 km. It is required to discharge 18 m^3 of water per second. Design the section using Manning's formula. Take coefficient of rugosity as 0.0015.
