22401

22223

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 Hydrostatics and Hydrodynamics.

b) State Pascal's law of fluid pressure.

c) Define pressure head and state it's S.I. unit.

d) State Bernoulli's theorem.

e) State minor losses with formula for anyone.

f) State use of Reynold's number.

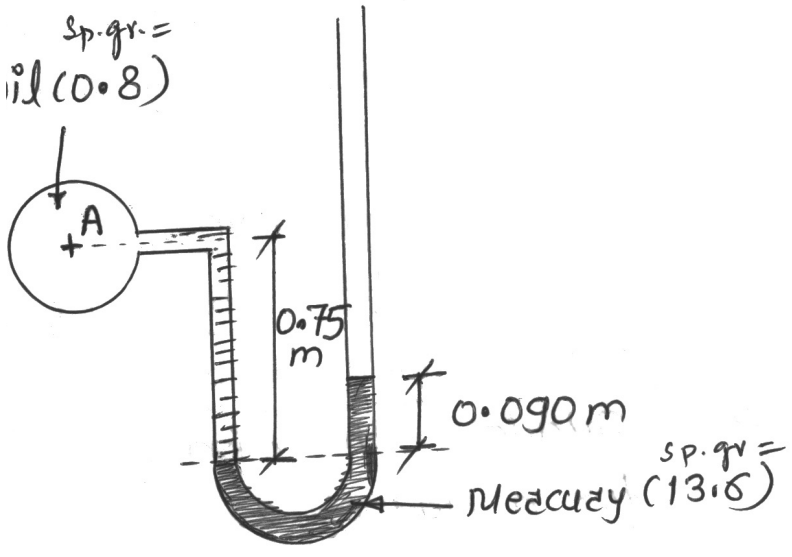
g) Define Hydraulic Gradient line and Total energy line.

Marks

2. Attempt any <u>THREE</u> of the following: **12**

a) Explain pressure diagram with it's use.

b) Calculate the pressure at point 'A' for the arrangement shown in Fig. No. 1.



<u>Fig. No. 1</u>

c) Calculate

i) Total pressure on one face of plate

ii) Position of centre of pressure when a circular plate of 3m diameter is submerged in water. It's greatest and least depth below the free surface of water are 2m and 1m respectively.

d) Convert 0.12 N/cm^2 into 'cm' of liquid of specific gravity 1.5.

Marks

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

a) Calculate the resultant pressure on the partition wall and position at which it acts when a partition wall 2m long divides a storage tank, on one side, there is turpentine of specific gravity 0.87 upto a depth of 1.5m. On the other side, there is paraffin of specific gravity 0.80 upto a depth of 1m.

b) Calculate pressure at section 'B' by neglecting losses for following data-
Water is flowing through a horizontal pipe having diameters 20cm and 10cm at section 'A' and 'B' respectively. The discharge passing through pipe is 30 lit/sec. and pressure at section 'A' is 350KN/m^2.

c) Explain the position of occurrence of hydraulic jump and state it's uses also.

d) Calculate total pressure and centre of pressure for a rectangular plate of size 4 × 3m. It is immersed vertically in water with 3m side parallel to free liquid surface and top of plate is 3.5m below free liquid surface.

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

a) Differentiate between open channel and pipe flow.

b) Differentiate between centrifugal and reciprocating pump.

c) Explain with example different types of flow.

d) Draw a neat sketch showing components of centrifugal pump and all heads.

e) Calculate the overall efficiency of the pump when a centrifugal pump is required to lift the water to a total head of 30m at the rate of 60lit/sec. Power required is found to be 22 KW.

Marks

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

a) Calculate pressure at lower end of pipe (Neglect frictional losses) for following data- A pipeline 300m long has a slope of 1:100 and tapers from 1.25 m dia. at higher end to 0.625m dia. at lower end. Discharge through pipe is 100 lit/sec. Pressure at higher end is 9.81 N/cm^2.

b) Liquid is discharging at the rate of 50 liters per sec through a sharp edged orifice of diameter 5cm placed under a constant head of 1.5m. A point on the jet measured from venacontracta of the jet has co-ordinates 50cm horizontal and 15cm vertical. Find C_c, C_d and C_v of orifice.

c) Calculate the discharge flowing through the pipe when a venturimeter 30cm dia. at entrance and 10cm dia. at throat is connected to the pipe in which water is flowing. The difference in mercury level of manometer is 6 cm.

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

a) Explain different types of hydraulic coefficients with relation between them.

b) Calculate the discharge over the notche for a head of 22 cm in following cases-

i) Triangular notch (θ=60° and cd = 0.625)

ii) Rectangular notch (L = 1.5m and cd = 0.6)

c) Calculate dimensions of most economical trapezoidal channel to carry flow of $16m^3$/sec. It is laid at a slope of 1:2000. side slope of channel is 1H: 2V. Take N=0.02.