22401

23242

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 the term 'Hydrostatics and Hydrodynamics'.

b) Define 'Mass density' and State it's SI unit.

c) Define atmospheric pressure and absolute pressure.

d) If 5 m^3 of certain oil weighs 40 KN. Calculate specific weight, Mass density.

e) State the applications of Centre of Pressure.

f) Define Laminar Flow and Turbulent Flow.

g) Write Chezy's equation used for determination of velocity of flow through open channel.

Marks

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

a) Explain, Why mercury is used in Manometers.

b) Convert the pressure of 0.5 N/mm^2 in meters of liquid of sp. Gravity 0.7.

c) A rectangular plate 5 m × 3 m is immersed vertically in water with 3 m side parallel to free liquid surface and top of plate is 3.5 m below free liquid surface. Find total pressure and centre of pressure for plate.

d) If 5 mm ϕ glass tube is immersed in water and contact angle is 5°, find capillary rise. Take surface tension for water as 0.074 N/m.

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

a) A circular plate 3 m in diameter is immersed in water such that, greatest and least depth below free surface of water are 4.5 m and 2 m respectively Determine total hydrostatic pressure on disc.

b) A tank 3 m × 5 m is filled with water up to depth of 2 m. Calculate total pressure on 5 m side of tank and bottom of tank.

c) State Bernoulli's theorem with it's assumption and equation.

d) A 10 cm diameter pipe carrying water at 1.4 m/sec changes to 15 cm diameter. Calculate discharge and velocity in the 15 cm diameter pipe.

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

a) Define Reynold's number and give it's significance.

b) A pipeline gradually varies from 15 cm diameter at 'A' to 7.5 cm diameter at 'B'. The point 'A' is 6 m above the datum, while point 'B' is 3 m above the datum. The velocity at 'A' is 3.6 m/sec. Determine pressure at 'B', if pressure at 'A' is 981 N/cm^2.

c) Calculate the discharge through pipe of diameter 20 cm, when difference of pressure head between the two ends of pipe 500 m apart is 4 m of water, take friction factor f = 0.036.

d) Write expression of any four minor losses in pipes.

e) A rectangular channel is 0.8 m deep and 3 m wide. Find the discharge through channel, when it runs full. Take slope of the bed as 1 in 4000 and Chezy's constant C = 85.

Marks

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

a) The diameter of horizontal pipe suddenly changes from 20 cm to 25 cm. The discharge from the pipe is 350 lps. Calculate head loss when water flows from smaller diameter pipe to larger diameter pipe and reversed with same discharge.

b) Explain phenomenon of water hammer in a pipe with it's effects and remedial measures.

c) Determine the dimension of most economical trapezoidal open channel for carrying flow 12 m^3/sec. The side slopes 1:1 and bed slope is 1 in 2500. Take Chezy's constant as 50.

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

a) What do you mean by Hydraulic jump? Explain with sketch.

b) Draw neat sketch of installation of centrifugal pump.

c) Differentiate between centrifugal and reciprocating pump.