17421

11718

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if necessary.

(4) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any TEN of the following : **20**

(a) Differentiate "Solid and Fluid". (any four)

(b) Define specific weight and give the value of specific weight of pure water.

(c) Express 7.8 m of water in N/m^2 and head of mercury.

(d) State Darcy Weisbach equation for friction loss in pipe.

(e) Write any two applications of hydraulics in Irrigation Engineering.

(f) Define "Froude number".

(g) Distinguish between Laminar and Turbulent flow.

(h) State any two uses of pitot tube.

(i) State the meaning of priming and its purpose.

(j) Define discharge and state its unit.

(k) Define the term "Surface Tension".

(l) Define HGL and TEL.

(m) State two limitations of piezometer.

2. Attempt any FOUR of the following : **16**

(a) A circular plate of 2 m diameter immersed vertically in liquid having sp. gravity 0.8., so that the center of plate is 3.5 m below free surface. Determine the total pressure and center of pressure.

(b) A 'U' tube differential mercury manometer connected two points of horizontal pipe carrying liquid of sp.gr. 1.2, shows differential reading of 25 cm. Find pressure difference between two point in term of N/m^2.

(c) Define :

(i) Specific gravity (ii) Specific volume

(iii) Ideal fluid (iv) Real fluid

(d) Write the Bernoulli's theorem and give any two limitations of its.

(e) Define Dynamic viscosity and kinematic viscosity with their ST unit.

(f) A concrete dam 12 m deep and 2 m wide containing water to a depth of 10 m. Find total hydrostatic pressure per meter run and center of pressure on upstream face.

3. Attempt any FOUR of the following : **16**

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

(b) A 5 m vertical pipe tapers from 150 mm diameter at lower end to 250 mm diameter at upper end. Determine the discharge through pipe, if flow is upward and pressure gauges fitted at ends of pipe indicate same value.

(c) State any four minor losses with their formulas.

(d) A liquid of specific gravity 0.9 is flowing through horizontal pipe of 100 mm diameter at the rate 25 lit/s. Find the total head at a point where pressure is 100 kPa. Consider datum height as a 2 m.

(e) Define hydraulic jump and state its two applications.

(f) Explain :

(i) Atmospheric pressure (ii) Absolute pressure

(iii) Gauge pressure (iv) Vacuum pressure

4. Attempt any FOUR of the following : 16

(a) State causes and effect of water hammer.

(b) Two tanks are connected by two parallel pipes of diameter 100 mm and 200 mm respectively having length of 700 m. Find the discharge through each pipe if difference in water level of two tank is 8.2 m. Take f = 0.027 for both pipes.

(c) Explain the working principle of current meter with neat sketch.

(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) Define the frictional loss and state any four factor affecting frictional loss.

(f) Differentiate any four points between Notch and Weir.

5. Attempt any FOUR of the following : 16

(a) A 80 mm diameter orifice discharges water 100 lit/s under a constant head of 6 m. The diameter of jet at vena-contracta is 7 cm. Calculate C_d, C_v and C_c.

(b) Explain with sketch working of the centrifugal pump.

(c) Enlist various methods of measuring velocity of open channel flow. Explain any one.

(d) A rectangular channel having cross Section 7 m wide and 1.8 m deep. The bed slope is 1 in 2000. Determine the velocity of channel if N = 0.03 and C = 42.

P.T.O.

(e) State and explain Dupuit's equation for equivalent pipe.

(f) Calculate power required for a pump under following condition :

(i) Water to be pumped = 4×10^6 lit/s

(ii) Pumping hours = 6 hours

(iii) Total lift = 10 m

(iv) All losses = 5 m

(v) Efficiency = 75%

6. Attempt any TWO of the following : **16**

(a) A pipeline 50 m long is connected to a water tank at one end and discharges freely into atmosphere at the other end. For the first 30 m of its length from tank, the pipe line is 15 cm diameter and its diameter suddenly enlarged to 30 cm. The height of water level in the tank is 8 m above center of pipe. Considering all losses of head, determine rate of flow f = 0.16.

(b) (i) A trapezoidal lined channel has 4 m bed width, 0.8 m depth of flow, side slope 1:1 and bed slope 1 in 3000. Find the capacity of channel if C = 60 in Chezy's formula.

(ii) Write the condition of most economical section for rectangular and trapezoidal channel.

(c) (i) Find the discharge over a triangular notch of angle 60°, when the head over the notch is 20 cm. Take $C_d = 0.625$.

(ii) Define specific energy. Explain specific energy diagram.