Scheme - G

Sample Question Paper

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17421**

Subject Title : Hydraulics

Marks : 100 **Time: 3 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q.1A) Solve any SIX of the following: **(12 Marks)**

a) State four uses of hydraulics in Irrigation.

b) If the specific gravity of oil is 0.80, what is its specific weight in N/m^3?

c) State in two steps, the conversion of pressure head of one liquid into another.

d) A liquid in piezometer stands 3m above the centre of pipe containing in liquid. Calculate the Pressure at centre of pipe if liquid is (i) water (ii) mercury.

e) List four types of minor losses in pipeline.

f) State two causes and two effects of Water hammer.

g) Draw a neat sketch of Venturimeter. Label any four component parts. List out any four components of Venturimeter.

h) State the significance of Cd and Cv in flow through orifice.

Q.1B) Solve any TWO of the following: **(8 Marks)**

a) Differentiate the behavior of liquids and solids with example.

b) Calculate the Kinematic Viscosity of oil whose specific gravity is 0.9 and viscosity is 0.1 N-S/m^2.

c) Define Total hydrostatic pressure & centre of pressure and state the unit of its measurement.

Q.2 Solve any FOUR of the following: **(16 Marks)**

a) Define pressure diagram with neat sketch and mention two applications of it.

b) A circular plate 3m diameter is immerged in oil of specific gravity 0.8. Such that it's greatest and least depth below the free surface of oil is 4.5m and 1.5m respectively.

Calculate - i) The total pressure on one face of the plate.

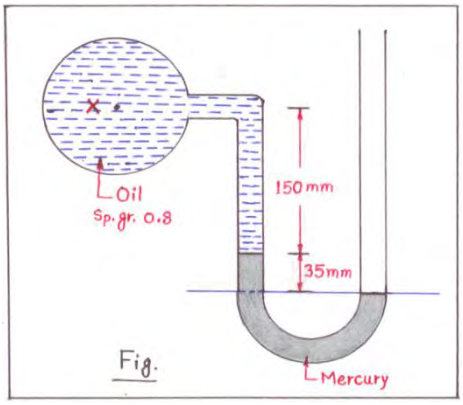
ii) The location of centre of pressure.

c) A masonry dam 7m high and 3m wide has water level 1m below its top.Calculate

i) Total pressure on one meter length of the dam.

ii) Depth of centre of pressure.

d) A simple manometer containing mercury was used to determine the pressure in pipe containing a liquid of specific gravity 0.8 as shown in figure. Calculate the pressure in mm of oil and in N/cm² at 'X'.



e) State four different types of flow of liquid with one practical example of each type.

f) Draw neat sketch of flow net showing streamlines and equipotential lines & state its use.

Q.3 Solve any FOUR of the following: (4x4)

a) The diameter of pipe changes from 240 mm at a section 5m above datum and 80 mm at section 2m above datum. The pressure of water at first section is 40N/cm². If the velocity of flow at the first section is 2m/s, calculate the intensity of pressure in N/cm² at the second section.

b) Velocity of flow of water in pipe line of 300 mm diameter is 2m/s from which 40 mm diameter pipe branches out. Velocity measured in the branch pipe is 3 m/s. What is the velocity of water in the main pipe beyond the branch line?

c) Write the procedure of determination of coefficient of friction of a given pipe in laboratory.

d) Three pipes having the same length and same friction factor having different diameters as 270 mm, 120 mm and 50 mm respectively. When three pipes are connected in parallel, gives a total discharge of 0.55m³/s. Find out the discharge in each pipe.

e) Explain the hydraulic gradient and total energy line with the help of neat sketch.

f) Define the following:

i) Wetted area

ii) Wetted perimeter

iii) Hydraulic mean depth

iv) Artificial channel

Q.4 Solve any FOUR of the following: (4x4)

a) Compare between uniform flow and non-uniform flow on any four points with one example.

b) Derive the conditions of most economical rectangular section.

c) Define Hydraulic jump and state its two applications.

d) Explain critical, sub-critical and super critical flow with reference to Froud's number.

e) Derive the relation between Cd, Cv and Cc and mention approximate values of the above for sharp edged circular orifice.

f) A 100 mm diameter orifice discharges 42 liters per second liquid under a constant head of 3m. The diameter of the jet at Vena Contracta is found by gauge to 88.1mm. Calculate Cc, Cv and Cd.

Q.5. Solve any FOUR of the following: (4x4)

a) Explain the method of determination of velocity of a stream with the help of current meter.

b) Determine the discharge through 60° triangular notch in lps under the head of 0.16 m. Take Cd=0.6.

c) Water is flowing over a rectangular weir 4m long under a head of 1.0 m. Calculate the discharge over the weir if Cd=0.6.

d) Enlist any four components of centrifugal pump with functions.

e) Compare Centrifugal pump and Reciprocating pump on any four points.

f) A centrifugal pump is required to pump 10 litre per second against a head of 40 m. Find the power required by the pump taking overall efficiency as 70%.

Q.6. Solve any TWO of the following: (2x8)

a) Explain construction and working of Bourdon's pressure gauge with the help of neat sketch and write two advantages of it.

b) The reservoir whose water level difference is 10 m are constructed by pipe line in series of the pipe of dia. 50 mm & 100 mm dia. and lengths 10m & 50m respectively. Take f1 = f = 0.024. Calculate the discharge from upper to lower reservoir.

c) A trapezoidal most economical channel section has side slopes 1.5(H) : 1(V). It is required to discharges 16 m^3/s with a bed slope of 0.5 m in 3.2 km. Design the section using Manning's formula. Take N = 0.015.

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Sample Test Paper-I

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17421**

Subject Title : Hydraulics

Marks : 25 **Time: 1 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. Solve any THREE of the following **(9 Marks)**

a) Define the following

i) Specific gravity ii) Mass density iii) Weight density

b) Differentiate between simple U-tube manometer and differential U-tube manometer.

c) Define Pascal's law of fluid pressure and give one practical application of it.

d) State three limitations of piezometer

Q2. Solve any TWO of the following. **(8 Marks)**

a) Differentiate between Ideal fluid and Real fluid.

b) The mass density of lubricating oil is 900kg/m³. Calculate specific weight and specific gravity.

c) A tank square in plan and with vertical side contains oil of specific gravity 0.8 upto a depth of 1.5 m. The size of tank is 1.5x1.5x2.5m. Calculate the total pressure and position of centre of pressure on one side of a tank.

Q3. Solve any TWO of the following. **(8 Marks)**

a) Calculate the height of mercury column equivalent to gauge pressure of 30 N/cm² and for 0.3 N/mm².

b) An inverted U tube differential manometer when connected to two parallel pipes carrying water shows reading 200 mm of oil of specific gravity 0.6. If a differential mercury manometer is connected to these pipes. Calculate the manometer reading.

c) A circular plate 1.5 m diameter is placed vertically in water, so that the centre of plate is 2.5 m below the free surface. Calculate the total pressure on the plate and depth of centre of pressure.

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Sample Test Paper-II

Course Name : Diploma in Civil Engineering Group

Course Code : CE/CS/CR/CV

Semester : Fourth **17421**

Subject Title : Hydraulics

Marks : 25 **Time: 1 Hrs.**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. Solve any THREE of the following **(9 Marks)**

a) Define Reynold's number and state its two applications.

b) List the different six types of minor losses.

c) Draw neat sketches of three shapes of artificial channel.

d) Mention three limitations of Bernoulli's theorem.

Q2. Solve any TWO of the following. **(8 Marks)**

a) Write any four differences between laminar flow and turbulent flow.

b) A pipe 300m long has slope 1:100 tapers from 600mm to 300mm diameter at lower end. The discharge of water flowing through pipe is 600 lit/sec. The pressure at higher end is 7 N/cm² and that at lower end is 11N/cm². Determine i) Direction of flow. ii) Loss of head.

c) Calculate the loss of head per km length of a new cast iron pipe having 200 mm diameter, friction factor, f=0.04, discharge is 10 lps.

Q3. Solve any TWO of the following **(8 Marks)**

a) Define the following:

i) Wetted perimeter ii) Wetted area iii) Hydraulic mean depth iv) Froud's number

b) Sketch the hydraulic jump and state the two uses of it.

c) A rectangular channel has bed width 3 m and depth of flow 1.2 m, bed slope 1:2000, C= 85. Calculate the capacity of canal and depth of flow when capacity is reduced to 50%.