Scheme – I

Sample Question Paper

Program Name : **Civil Engineering Program Group**
Program Code : **CE/CR/CS**
Semester : **Fourth**
Course Title : **Hydraulics**
Max. Marks : **70** **Time: 3 Hours**

22401

Instructions:

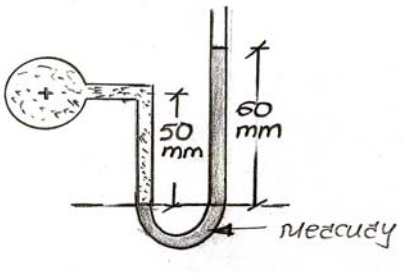
1) All questions are compulsory.
2) Illustrate your answers with neat sketches wherever necessary.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.
5) Preferably, write the answers in sequential order.

Q.1 Attempt any Five of the following. **(10 Marks)**

a) Define weight density and mass density with its unit.
b) Give importance of hydraulics in irrigation engineering.
c) Draw a neat sketch of pressure diagram showing variation of pressure on side wall of tank and bottom of tank containing liquid.
d) Interpret type of flow using Reynold's Number.
e) Describe with formula major loss in pipe.
f) Define steady and unsteady flow with practical example
g) Explain phenomenon of water hammer

Q.2 Attempt any Three of the following. **(12 Marks)**

a) Define 1) Atmospheric pressure 2) Gauge Pressure 3) Absolute Pressure 4) Vacuum Pressure
b) A simple U tube mercury manometer as shown in the Fig. 1 is used to measure the pressure of water flowing in a pipeline. Determine the pressure in pipe in terms of head of water



c) A circular plate of 2 m. diameter is immersed vertically in an oil of specific gravity 0.84as shown in fig.2 find the oil pressure on the plate and position of center of pressure on plate.

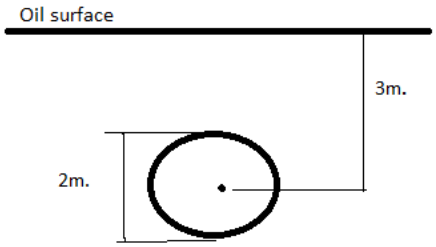


Fig. 2

d) Convert the pressure of 0.8 N/mm^2 in meters of liquid of specific gravity 0.75

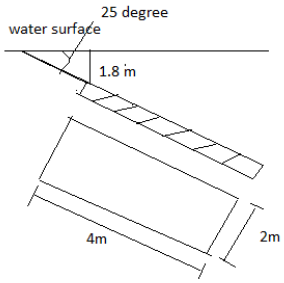
Q.3) Attempt any Three of the following. (12 Marks)

a) A tank contain water for a height of 0.5 m and an immiscible liquid of Specific gravity 0.8 above the water for height of 1m find the resultant pressure per meter length of tank

b) A horizontal pipe carrying water tapers from 20 m diameter at A to 10 cm diameter at B in a length of 2 m. The pressure at A is $100N/cm^2$. If the discharge is 600 lit/min calculate pressure at B in N/cm^2. If the loss of head from A to B is 10cm.

c) Describe with sketch working of current meter.

d) Calculate total pressure and center of pressure for a rectangular plate 2m wide and 4 m deep which is immersed in water such that its plane makes an angle 25^0 with water surface.



Q.4) Attempt any Three of the following. (12 Marks)

a) Calculate the discharge through rectangular channel of width 8 m having bed slope 1 in 1000. Depth of water in channel is 5 m. (Take Chezy's constant C= 50)

b) Differentiate between Centrifugal and Reciprocating pump (Any four points).

c) A centrifugal pump is required to pump 10lit/sec against a head of 40m. Find the power required by pump if efficiency of pump is 70%

d) Differentiate between a) Uniform & Non-uniform flow b) Laminar & Turbulent flow

e) Explain with neat sketch working of single acting reciprocating pump

Q.5) Attempt any Two of the following. (12 Marks)

a) Calculate loss of head and direction of flow for a pipe 300m long having slope of 1 in 200. It tapers from 1.2m Diameter at higher end to 0.6m diameter at lower end. Discharge of water flowing through pipe is 900 lit/Sec. Pressure at higher end is $7N/cm^2$ and at lower end $11N/cm^2$

b) Calculate discharge through pipe line having length 50m and it is connected to a reservoir. The head above inlet is 8 m and pipeline discharges freely at other end. The diameter of first 25 m length is 15 cm and for remaining length is 30 cm. Consider all losses (f=0.04)

c) Calculate discharge and pressure difference between entrance and throat for a Venturimeter of size 30x 15 cm if it is provided in a Vertical pipeline carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of throat selection and entrance of Venturimeter is 50 cm the differential U tube mercury manometer show a gauge deflection of 30 cm.

Q.6) Attempt any Two of the following. (12 Marks)

a) Explain Moody's diagram and Nomograms with its use

b) Design a trapezoidal most economical channel section having side slope of 2V:3H. It discharges water at rate of 20 cumec with bed slope 1 : 2000 (Take Manning's constant 0.01)

c) Explain advantages of triangular notch over rectangular notch and calculate discharge over triangular notch of angle 60^0 when the head over the notch is 20 cm. (Take cd=0.625).

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Scheme – I

Sample Test Paper - I

Program Name : **Civil Engineering Program Group**

Program Code : **CE/CR/CS**

22401

Semester : **Fourth**

Course Title : **Hydraulics**

Max. Marks : **20** **Time: 1 Hour**

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

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Q.1 Attempt any FOUR of the following. **(8 Marks)**

a) Define dynamic viscosity and kinematic viscosity.
b) Calculate specific weight of oil in N/m^3 whose specific gravity is 0.85.
c) Define total pressure and centre of pressure with its unit.
d) Find the total pressure and position of centre of pressure on one side of the tank containing oil of specific gravity 0.8 upto a depth of 1.5m. Size of tank 1m x 1m x 2m.
e) Explain the reasons of using mercury in the manometers.
f) Differentiate between simple U tube manometer and differential U tube manometer.

Q.2 Attempt any THREE of the following. **(12 Marks)**

a) Find specific weight, mass density, and specific gravity of a liquid having weight 15KN and occupies $7.5m^3$ volume.
b) Find the resultant pressure and its position for a tank containing liquid of specific gravity 0.78 to a depth of 1.0m on one side while on other side there is an oil of specific gravity 0.88 to a depth of 1.2m.
c) A circular plate of 4m diameter is immersed in water such that its greatest and least depth below the free surface of water are 5m and 3m respectively, calculate total pressure on one face of plate and position of centre of pressure.
d) A pipe line carrying oil of specific gravity 0.8 changes in diameter from 300 mm at position 1 to 600 mm in diameter at position 2 which is at a higher level. If the pressure at position 1 and 2 are $100KN/m^2$ and $60KN/m^2$ respectively and discharge is 300litre/sec determine the loss of head.
e) Define: i) Reynolds number ii) Pressure head iii) Velocity head iv) Datum head

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Scheme – I

Sample Test Paper - II

Program Name : Civil Engineering Program Group

Program Code : CE/CR/CS

Semester : Fourth

22401

Course Title : Hydraulics

Max. Marks : 20 **Time: 1 Hour**

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

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Q.1 Attempt any FOUR of the following. (8 Marks)

a) Describe the principle on which Venturimeter works.
b) Explain the causes and remedial measures of water hammer.
c) Define most economical channel station.
d) Explain the terms with respect to open channel flow.
   i) Hydraulic mean depth ii) wetted perimeter
e) Explain the term priming in pumping and its need.
f) List the main component parts of centrifugal pump.

Q.2 Attempt any THREE of the following. (12 Marks)

a) Define hydraulic coefficients. State the relationship among the hydraulic coefficients for an orifice.
b) Find the diameter of uniform pipe to replace a compound pipeline having
   i)45cm diameter pipe for 900m length,
   ii)37.5cm diameter pipe for 450m length and
   iii)30cm diameter pipe for 300m length. The total length of uniform pipe should remain the same.
c) Water flows through a rectangular open channel having width of 2m and flow depth of 0.6m with discharge $4m^3$/sec. Find fraud's number.
d) Determine the discharge through 80^0 triangular notch in lit/sec when the head is 0.4m take cd=0.62.
e) A centrifugal pump delivers water at 20lit/sec to a height of 15m through a pipe of 80m long and 150mm in diameter. If overall efficiency of pump is 75% then with consideration of suction head find the power required to drive the pump take f=0.012.
