22401

21819

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 weight density and relative density and give its unit.

b) Define total pressure and centre of pressure with its unit.

c) Define datum head and pressure head and give its unit.

d) Enlist any two factors on which friction coefficient 'F' depends.

e) State the formula for specific energy with components names.

f) Define suction head and delivery head with diagram.

g) Define uniform flow and non uniform flow and give practical example for each.

Marks

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

a) Explain with sketch variation of pressure in horizontal and vertical direction in static liquid.

b) State and explain Bernoullis theorem with any two practical application of it.

c) Find the discharge through the pipeline 20 cm in diameter and 1500 m long . The drop in water level is 10 m. Assume F = 0.02. Also draw TEL.

d) A 15 cm diameter pipe suddenly enlarge to 20 cm diameter. Calculate discharge through pipe if loss of head due to sudden enlargement is 30 cm of water.

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

a) Explain the procedure for measurement of density of an oil in laboratory.

b) A differential manometer connected to two pipes A and B in a pipeline containing an oil of specific gravity 0.75. A manometer reading is 0.75 m of calcium carbide of specific gravity 1.05 .Find the pressure difference in kPa. If points A and B are at the same level and oil flows from A to B as shown in Fig. No. 1.

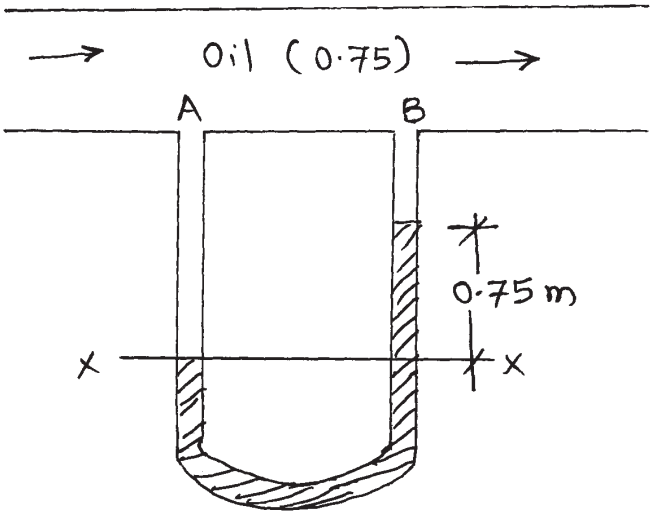

Fig. No. 1

Marks

c) Explain with sketch working of syphon pipe.

d) State with sketch different shapes of Artificial channels. Give the formula for wetted area, wetted perimeter for any two.

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

a) Differentiate Reciprocating pump with centrifugal pump.

b) (i) Explain Dupuit's equiation for equivalent pipes.

(ii) Define Moody's diagram with its use.

c) (i) Define Reynold's number and give any two applications of it.

(ii) Find the discharge flowing through a pipe of 10 cm dia and velocity is 1 m/sec.

d) A circular plate of 4m diameter is immersed in water such that its greatest and least depth below the free surface of water are six meters and four meters respectively. Calculate:

(i) Total pressure on one face of the plate.

(ii) The position of centre of pressure.

e) Define surface tension and capillarity with sketch. Give practical example of each.

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

a) State the classification of losses in pipe with suitable sketches and equations for each.

b) Determine the most economical section of a trapezoidal channel for carrying discharge 15 m^3/sec with bed slop of 1:4500. The side slopes are 4H:3V. Take Manning's constant 0.015.

Marks

c) Calculate the power of the pump from following data.

(i) Total Static lift = 25 m

(ii) Diameter of suction pipe = 12 cm

(iii) Diameter of delivery pipe = 10 cm

(iv) Length of suction pipe = 5 m

(v) Length of delivery pipe = 50 m

(vi) F = 0.03 for both pipes

(vii) Q = 30 lit/sec.

(viii) Efficiency = 85%.

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

a) Find the intensity of pressure in N/m^2 on the base of the container when,

(i) Water stands to height of 1.25 m in it.

(ii) Only oil stands for 1.25 m. The specific gravity of oil is 0.80.

(iii) When oil height is 0.625 m stands on water of 1m height.

Draw the pressure diagram for all cases.

b) Find the resultant pressure and its position for a tank wall containing liquid of specific gravity 0.8 to a depth of 1.5 m on one side, while on other side there is water to a depth of 3.0 m.

c) A horizontal pipe carrying water tapers from 30 cm dia at A to 15 cm dia at B in a length of 6 m. The pressure at A is 100 N/cm^2. If the discharge is 600 lit/min. Calculate pressure at B in N/cm^2. If the loss of head is 10 cm of water. Also calculate pressure in pipe at it mid length.