# 22401

**11920**

**3 Hours / 70 Marks** Seat No. | | | | | | | | |

*Instructions* – (1) All Questions are *Compulsory.*

(2) Illustrate you answers with neat skethces wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

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

(6) 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 viscosity.

b) Why mercury is used in manometer?

c) Define pressure head and give its unit.

d) Define Reynold's number.

e) State the principle of venturimeter.

f) Define discharge and state its unit.

g) State two uses of syphon.

h) Define Hydraulic Radius for trapezoidal channel.

**Marks**

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

a) Write any two applications of hydraulics in Irrigation Engineering.

b) A liquid weighs 25 kN and occupies 3.75 $m^3$, find its specific weight, mass density, specific gravity and specific volume.

c) Explain the concept and use of pressure diagram with neat sketches.

d) Explain with a neat sketch the working of Bourdon's pressure guage.

e) State the causes and remedial measures of water hammer in pipes.

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

a) A square plate is submerged vertically in oil of specific gravity 0.9 as shown in Fig. No. 1 Find the total pressure and position of centre of pressure.

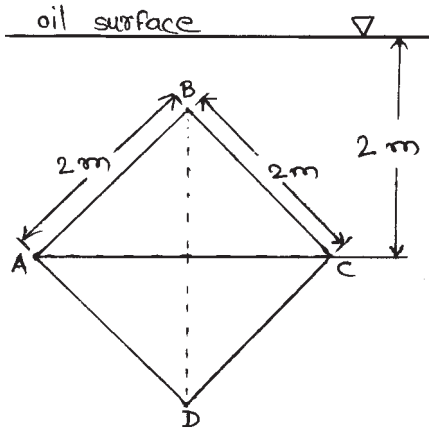


**Fig. No. 1**

b) Explain Reynold's number with its equation and give its significance.

c) Differentiate any four points between notch and weir.

d) A concrete dam 15 m deep and 2 m wide containing water to a depth of 10 m. Find total hydrostatic pressure per meter run and centre of pressure on upstream face.

e) Water is flowing through a rectangular channel of width 5 m and bed slope 1 in 1200. Depth of flow is 1.75 m. Find the discharge through the channel. Take c=50.

**Marks**

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

a) What is most economical channel section? Write conditions for rectangular channel section to be economical.

b) Differentiate between turbines and pumps on any two factors.

c) A centrifugal pump is required to pump 15 lit/sec against head of 32 m. Find the power required by the pump taking overall efficiency 75%.

d) State Bernoulli's theorem. State any two applications of it.

e) Explain with sketch working of centrifugal pump.

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

a) A conical pipe has diameter 40 cm at the larger end and 20 cm at the smaller end and forms a part of a vertical main. The pressure head at the larger end is found to be 30 m and at the smaller end 22 m of water. Find the discharge through the pipe, if the length of conical portion is 2 m. assuming no losses and the larger end is at the top.

b) Two reservoirs are connected by a pipeline consisting of two pipes, one of 10 cm diameter and length 6 m and other of 20 cm diameter and 16 metre length. If the difference of water level in two reservoirs is 6 m, calculate discharge.

c) Water discharge at the rate of 0.09 $m^3$/sec through 10 cm diameter vertical sharp edged orifice placed under a constant head of 8 m. A point on the jet measured from vena contracta of the jet has co-ordinates 4.5 m horizontal and 0.54 m vertical. Find the coefficients $C_c$, $C_d$ and $C_v$ of the orifice.

**Marks**

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

a) What are major and minor loss of head in flow through pipes? Write any two equations of minor loss.

b) A trapezoidal channel of most economical section has side slopes 1.5 (horizontal): 1 (vertical). It is required to discharge 15 $m^3$ of water per second with a bed slope of 0.5 metre in 3 km. Design the section using Manning's formula. Take coefficient of rogosity as 0.015.

c) A triangular notch of angle $120^o$ is used to measure the discharge. Determine the head over the notch, if discharge is 1500 lits/minute. Assume $C_d$ = 0.6.