23 Novemberr2010

College of Engineering, Pune

End Semester - 2010

S.Y. B. Tech Civil Engineering

CE 202 BUILDING CONSTRUCTION & MATERIALS

Max. Marks- 50 Duration – 3 hours

Instructions:
1. Answer any five questions.
2. Neat diagrams must be drawn wherever necessary.
3. Assume suitable data if necessary.
4. Figures to the right indicate full marks.

Q. 1	A.	Explain differential settlement with neat and labeled sketch.	5
	B.	What is deep foundation? Explain types of pile foundations?	5
Q. 2	A.	What is pointing? Why it is required? Draw sketches of types of pointing?	5
	B.	Illustrate neat sketch of successive course in plan and elevation to construct 1½ brick thick wall in English bond.	5
Q. 3	A.	List out different types of floor finishes and their suitability.	5
	B.	What are the various types of pitched roofs? Draw sketch of 1. Lean to roof 2. Collar beam roof.	5
Q. 4	A.	Discuss briefly the following aspects as applied to door and windows. 1. Function or purpose 2. Location	5
	B.	Draw a labeled sketch of semicircular arch and indicate the following: Springing line, Key stone, Spandril, Voussoirs, Rise.	5
Q. 5	A.	Explain the situation in which the following means of vertical circulation are favoured : 1. Escalators 2. Ramps 3. Elevators 4. Spiral Staircase 5. Straight staircase	5
	B.	Differentiate between scaffolding and shoring.	5
Q. 6		Write short notes on the following (any two) 1. Types of welding joints 2. Types of Paints 3. Lime	10

End

College of Engineering Pune

Department of Civil Engineering

Applied Mechanics Division

(CE203) Strength of Materials

S.Y.B.Tech (Civil) Semester-I

Saturday, 20th November 2010

Time: 10 am -1 pm

End Semester Examination

Max. Marks: 50

Instructions:

1. Solve any **five** questions. Each question carries ten marks.
2. Make necessary assumptions and assume suitable data wherever required and state it clearly.

Q.1(a) A composite bar is constructed from a steel rod of 25 mm diameter, surrounded by a copper tube of 50 mm outside diameter and 25mm inside diameter. The rod and the tube are joined by two 20 mm diameter pins, as shown in Fig.Q.1 (a). Find the shear stress set up in the pins, if after pinning the temperature is raised by 50^0C.

$E_{steel} = 210$ GPa, $\alpha_{steel} = 11 \times 10^{-6}/\,^0$C

$E_{cu} = 105$ GPa, $\alpha_{cu} = 17 \times 10^{-6}/\,^0$C

(8)

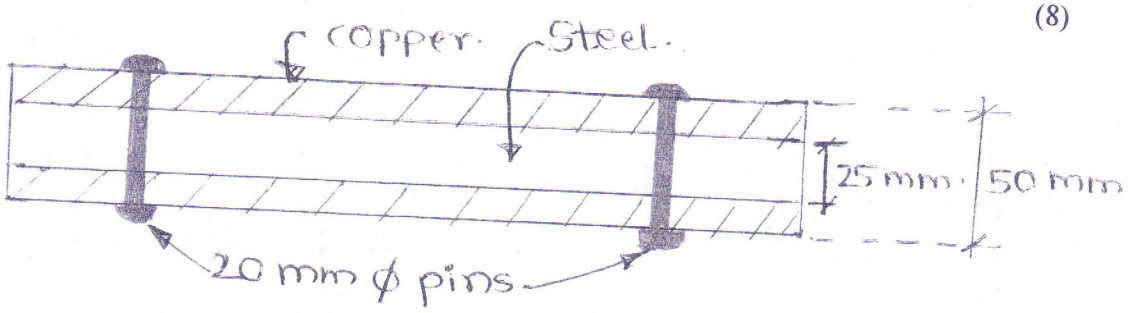

Fig. Q.1(a).

Q.1(b) Draw Mohr's circle for each element subjected to the state of stress as shown in Fig.Q.1(b)

(2)

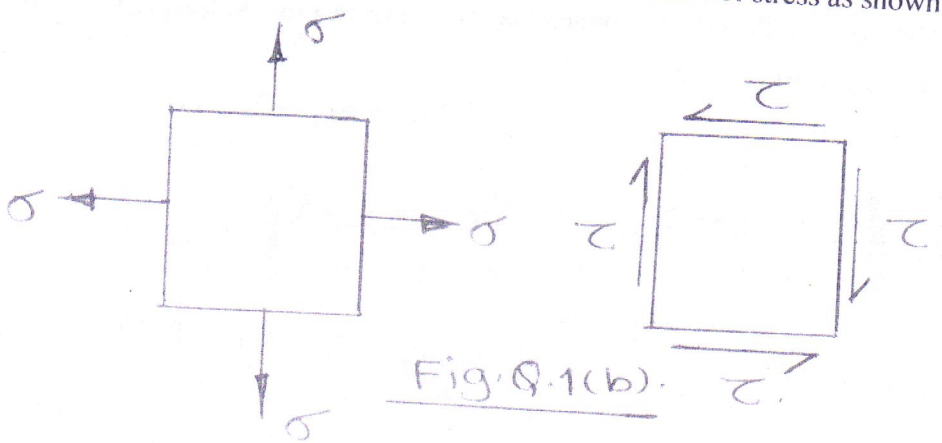

Fig. Q.1(b).

Q.2(a) Find the maximum deflection in a simply supported beam, loaded as shown in Fig.Q.2(a). $EI = 24000\ kNm^2$.

(7)

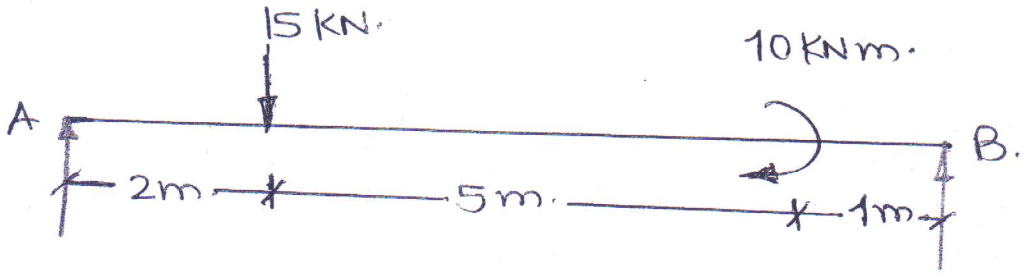

Fig. Q. 2(a).

Q.2(b) State the limitations of Euler's formula for columns. Show how Rankine's formula is applicable to any type of column.

(3)

Q.3(a) For the over-hanging beam shown in Fig.Q.3(a), plot shear force and bending moment diagrams. Locate point of contra-flexure, if any.

(7)

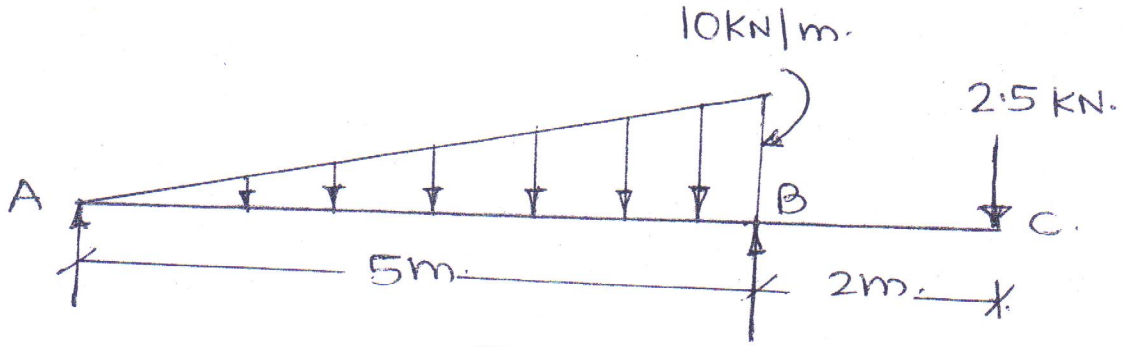

Fig. Q. 3(a).

Q.3(b) A cantilever beam is loaded as shown in Fig.Q.3(b). Find the ratio of magnitude of load 'P' to that of the intensity of uniformly distributed load 'w', such that the deflection at the free end of cantilever is zero. EI is constant.

(3)

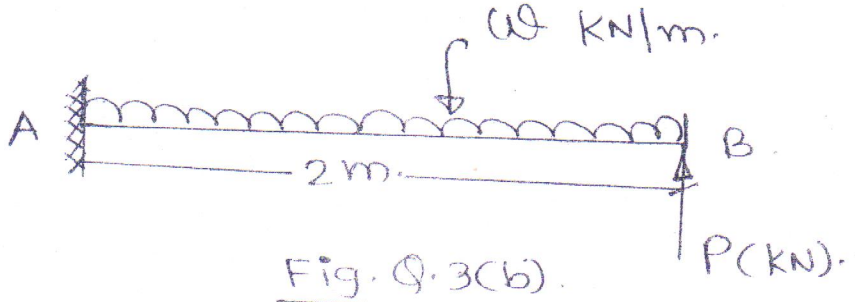

Fig. Q. 3(b).

Q.4(a) For the cantilever beam shown in Fig.Q.4(a), calculate the principal stresses, locate principal planes and calculate the maximum shear stress at point 'A'. (8)

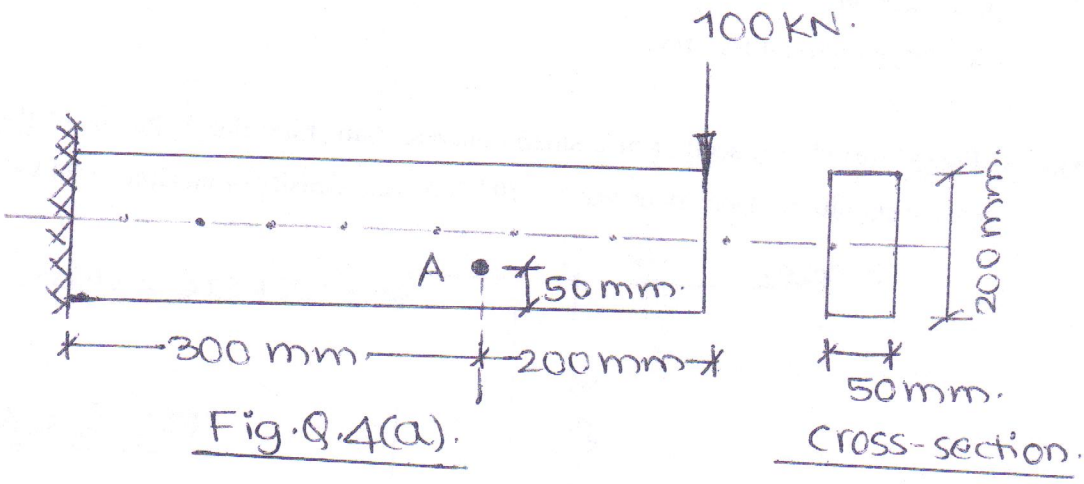

Fig.Q.4(a).

Q.4(b) For a mild steel column hinged at both ends, determine the limiting value of the slenderness ratio, below which Euler's formula does not apply. Assume yield stress of Mild Steel = 210 MPa and E = 200 GPa. (2)

Q.5(a) A compound shaft consists of a Steel segment and an Aluminium segment . It is acted upon by two torques, as shown in Fig.Q.5 (a). Determine the maximum permissible value of 'T', subjected to the following conditions:

(i) Maximum shear stress in steel = 85 MPa.

(ii) Maximum shear stress in Aluminium = 50 MPa.

(iii) Angle of twist at the free end should not exceed 5^0

G_{steel} = 80 GPa and G_{Al} = 28 GPa. (7)

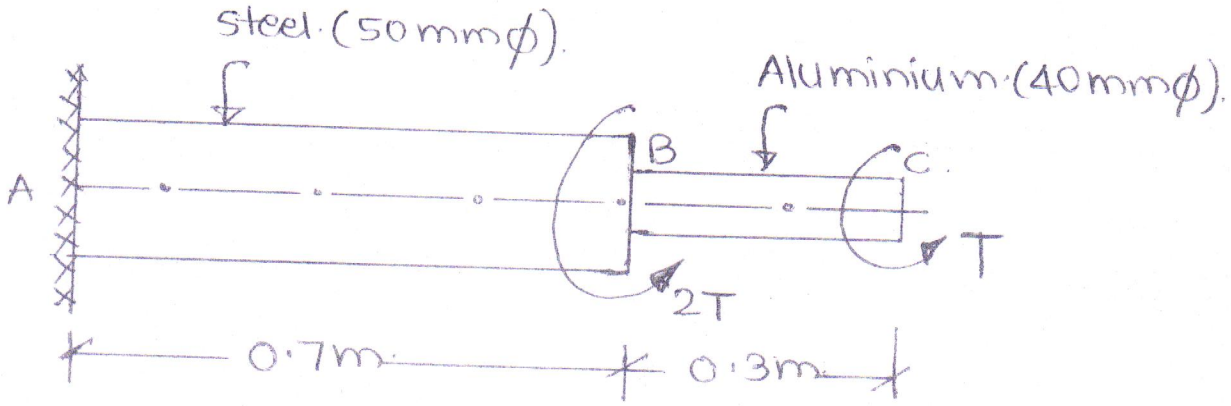

Fig.Q.5(a).

Q.5 (b) Plot shear stress distribution diagram for:

(i) T- section

(ii) L- section

(iii) Unsymmetrical I-section

(3)

Q.6 (a) Fig.Q.6 (a) shows section of a small concrete dam. Find the width 'b' of the dam for no tension condition. Density of water = 10 kN/m^3 and density of concrete = 24 kN/m^3

(7)

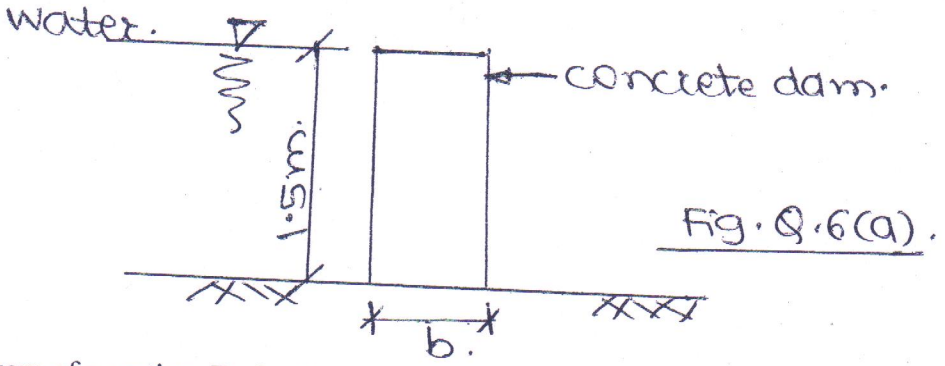

Fig. Q.6(a).

Q.6 (b) Define kern of a section. Derive the expression for core of a rectangular section of width 'b' and depth'd'.

(3)

Good luck!!

College of Engineering, Pune
End Semester Exam – November 2010
S.Y. B. Tech. (Civil)
CE-201- Fluid Mechanics-I

Day & Date- Friday 12th November 2010 | Time: - 10.00am to 1.00 pm
Maximum Marks: 100 | Duration – 3 hrs.

Instructions

1. Solve **any Five** questions from the following
2. Neat figures must be drawn where necessary
3. Do not omit any steps and units in numerical as each step carry marks.
4. Do not leave blank pages between two answers **marks may be deducted**.
5. Clearly write question numbers you are attempting in answer book against each answer.

Q. 1 **a)** Define following (**any six**) **(12)**

i) Ideal fluid
ii) Manometer
iii) Orifice
iv) Notch
v) Potential function (Φ)
vi) Impulse of a force
vii) Hydraulic grade line
viii) Momentum correction factor (β)

b) Figure-01 shows a compound manometer. Find the pressure between A and B **(08)**

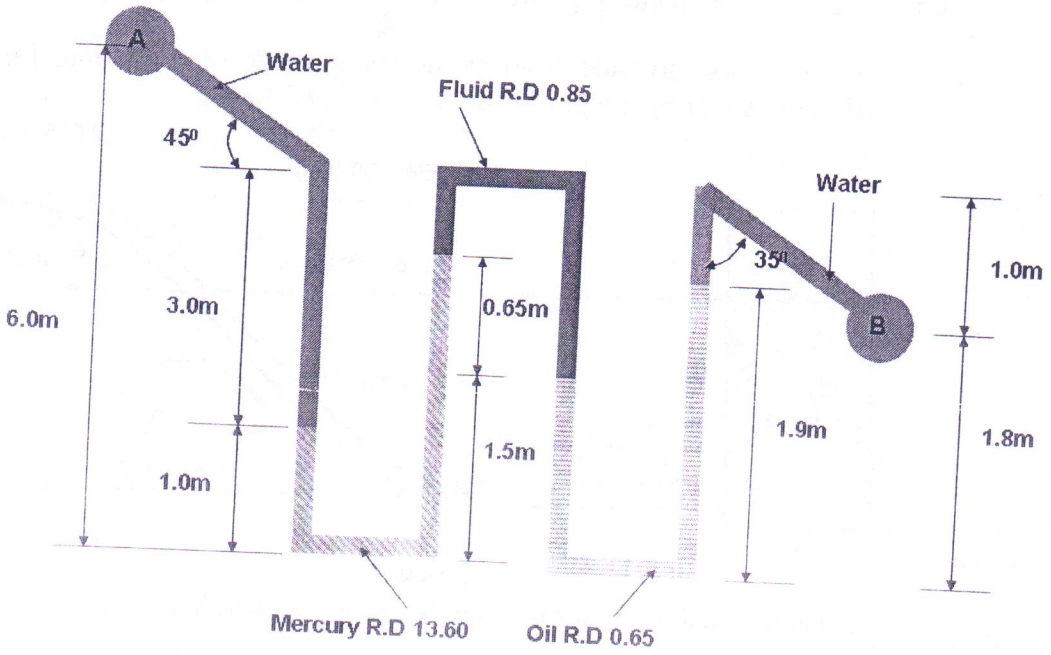

Figure-01

Q. 2 **a)** Determine the force F required to hold the cone in the position shown in Figure-02. Assume the cone is weightless **(12)**

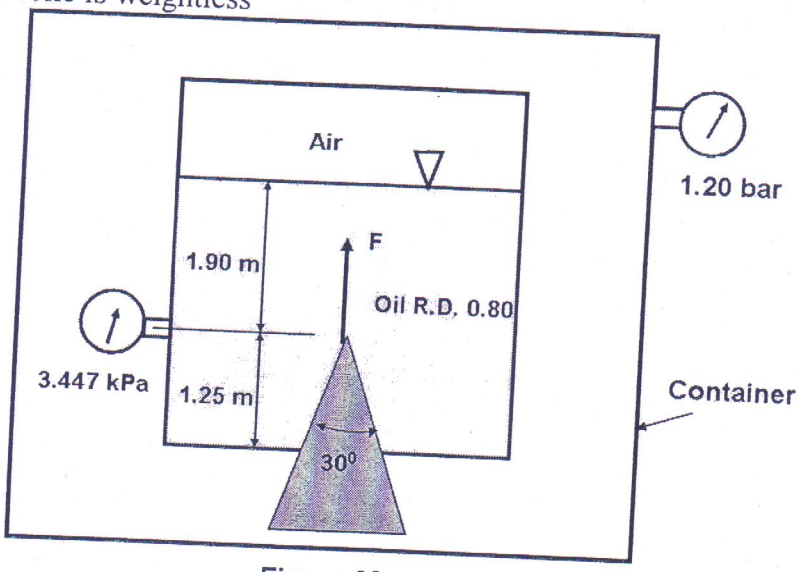

Figure-02

b) A flow is defined by $u= 2xzy^2 (1+t)$, $v= 3zyx^3(1+t)$, $w= 4xyz^2(1+t)$. What is the velocity of flow at the point (3,2,4) at t=2 ? What is the acceleration at that point at t=2 ? Specify units in terms of L and T. Check and state whether the flow is rotational or irrotational. **(08)**

Q. 3 **a)** In a fire fighting system, a pipeline with a pump leads to a nozzle as shown in Figure-03. Find the flow rate when the pump develops a head of 30 m, given that we may express the friction head loss in the 0.15 m dia pipe by $h_f = \frac{5V^2}{2g}$ and the friction head loss in the 0.10m diameter pipe by $h_f = \frac{12V^2}{2g}$. Sketch the energy line and hydraulic grade line. Find the pressure head at the suction side of the pump. Find the power delivered to the water by the pump and the power of the jet. **(12)**

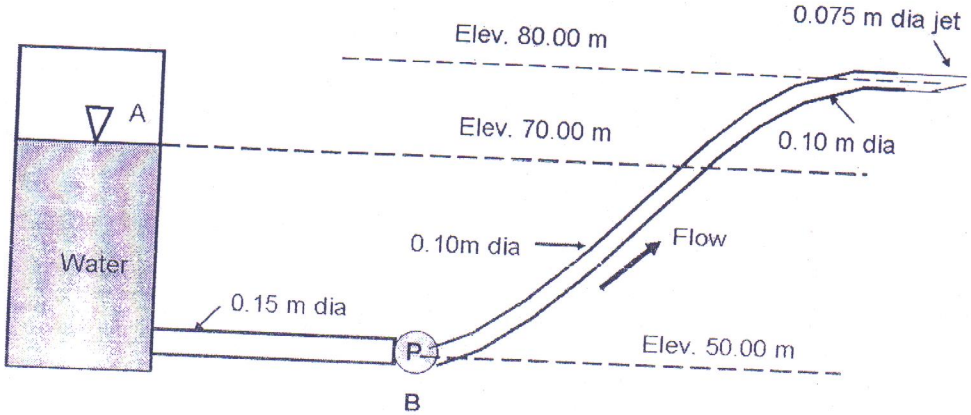

Figure-03

b). Use dimensional analysis to arrange the following groups in to dimensionless parameters **(08)**

i) τ, V , ρ ii) V, L, ρ, σ. Use M, L, T system

Q. 4 **a)** Two pipes with a diameter ratio 1:2 are connected in series as shown in Figure-04. With a velocity of 6.8 m/s in the smaller pipe, find the loss of head due to i) Sudden enlargement ii) Sudden contraction iii) Expansion in a conical diffuser with a total angle of 30^0 and 10^0. **(12**

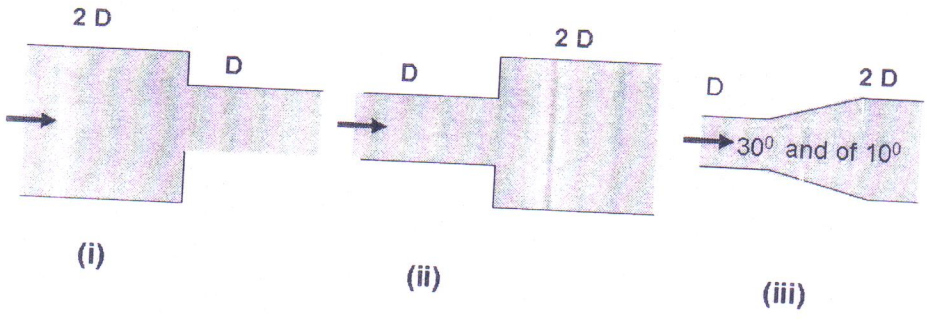

Figure-04

b). In a refinery oil with R.D. = 0.80, and $\upsilon = 1.8 \times 10^{-5}$ m^2/s flows through a 100 mm dia pipe at 0.50 lit/s. Is the flow laminar or turbulent ? Find the centerline velocity, the velocity at r=20 mm, the friction factor, the shear stress at the pipe wall and the head loss per meter of pipe length **(08)**

Q. 5 **a)** The cone shaped tank as shown in Figure-05 has a orifice (C_d=0.60) in the bottom. Given D_1= 12.0 m and D_2=5.6 m, Z_0= 10.4 m and that the water level outside the tank is constant at section-2, how long will it take the water level in the tank to drop from section 1 to section 2 ? (Note: The tank diameter = ky, and $y=z+h_2$, where z is the variable distance between surface levels.) **(12)**

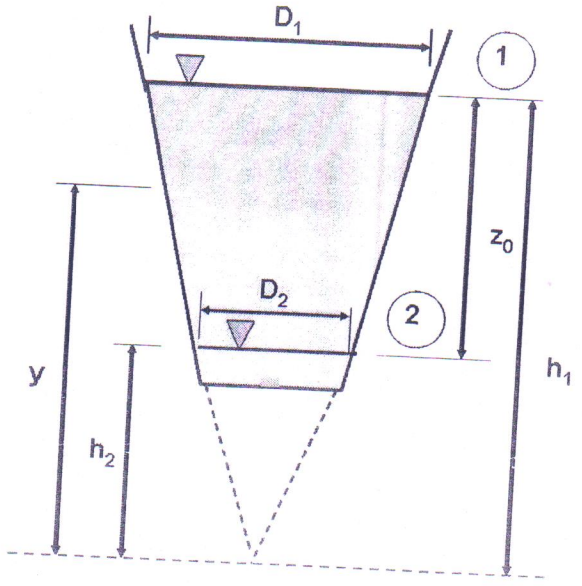

Figure-05

b). A 60^0 V-notch weir and rectangular weir with end contractions (crest length =0.60 m) are both used to measure a flow rate of approximately 7 L/s . Assuming C_d is known to be minimum for each weir, compute the percentage of error in Q that would result from an error of 5mm in the respective head measurements. **(08)**

Q. 6 a) Two parallel plates are placed horizontally 10mm apart. The bottom plate is fixed and the top plate is moved at a uniform speed of 0.25 m/s. The fluid between them has a dynamic viscosity μ equal to 1.472 N-s/m2. Determine the pressure gradient which corresponds to the condition of zero discharge between the plates and the shearing stress at each plate. **(12**

b) Derive the expression for the velocity distribution equation for turbulent flow in terms of mean velocity, for smooth and rough pipes. Given that with standard notations **(08**

$$\frac{v}{V_*} = 5.75 \log_{10}\left(\frac{V_* y}{\upsilon}\right) + 5.5$$

and

$$\frac{v}{V_*} = 5.75 \log_{10}\left(\frac{y}{k}\right) + 8.5$$

b)

OR

Mean point velocities measured with the help of a pitot tube at-mid point and quarter point of a 0.20m diameter pipe were found to be 1.50 m/s and 1.35 m/s respectively. If the flow in the pipe is turbulent, determine the discharge, friction factor and average height of roughness projections. **(08)**

Q. 7 a) In Figure-06 assume that friction is negligible, $\theta = 115^0$, and that the water jet has a velocity of 25 m/s and a diameter of 40mm. Find : **(12)**

i) The component of the force acting on the blade in the direction of the jet.
ii) The magnitude force component normal to the jet.
iii) The magnitude and direction of the resultant force exerted on the blade.

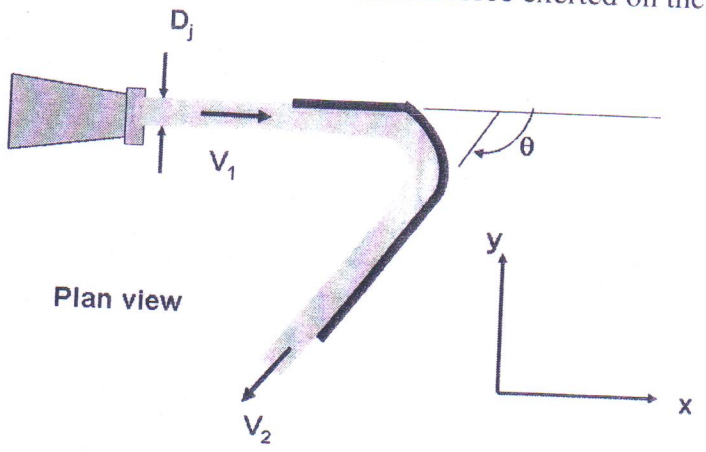

Figure-06

b) At a particular instant an airplane is traveling upward at a velocity of 180 m/sec in a direction that makes an angle of 40^0 with the horizontal. At this instant the airplane is losing its speed at the rate of $4m/s^2$. Also it is moving on a concave-upward circular path having a radius of 2600 m. Determine for the given conditions the slope of the free liquid surface in the fuel tank of this vehicle. **(08)**