

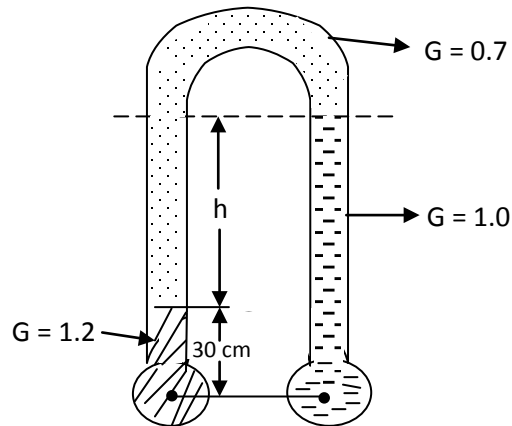
B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2016
FLUID MECHANICS & HYDRAULIC MACHINERY
 (Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
 All questions carry equal marks

- 1 (a) Find out the differential reading 'h' of an inverted U-tube manometer containing oil of specific gravity 0.7 as the manometric fluid when connected across pipes A and B as shown in the following figure, conveying liquids of specific gravities 1.2 and 1.0 and immiscible with manometric fluid. Pipes A and B are located at the same level and assume the pressures at A and B to be equal.



- (b) Define viscosity. What is Newton's law of viscosity?
- 2 (a) What is Bernoulli's equation? Also list the assumptions.
 (b) What are rotational and irrotational flows? Also give the rotational components in x, y and z directions.
- 3 (a) Explain Reynold's experiment.
 (b) Starting from first principles obtain the following expression for discharge of a liquid through a venturimeter $Q = K C \sqrt{h}$ where Q is discharge in m^3/s , K is the discharge coefficient of the venturimeter and h is venturi head in meters of fluid flowing through the venturimeter.
- 4 A jet of water 80 mm diameter and having a velocity of 20 m/s impinges at the centre of hemispherical vane. The linear velocity of vane is 10 m/s in the direction of jet. Find the force exerted on the vane. How this force would change if the jet impinges on a series of vanes attached to the circumference of wheel?
- 5 What are the various elements of hydro electric power station? Explain in detail.
- 6 A single jet Pelton wheel runs at 300 r.p.m under a head of 510 m. The jet diameter is 200 mm, its deflection inside the bucket is 165° and its relative velocity is reduced by 15% due to friction. Find water power, resultant force on the bucket and overall efficiency. Take mechanical losses = 3%, coefficient of velocity = 0.98 and speed ratio = 0.46.
- 7 (a) What is meant by governing of turbines? Also give the procedure for governing of turbines.
 (b) In a hydroelectric station water is available at the rate of $175 m^3/s$ under a head of 18 m. The turbines run at a speed of 150 r.p.m with overall efficiency of 82%. Find the number of turbines required if they have the maximum specific speed of 460.
- 8 Explain working of a centrifugal pump with neat sketch.