

B. CIVIL ENGG. (EVENING) EXAMINATION, 2017

(1st Year, 1st Semester, Supplementary)

Hydraulics (OLD)

Full Time : 3 Hours

Answer any FIVE only

Full Marks : 100

1. (a) Derive the expression for the discharge through a triangular notch. 7
 (b) A Venturimeter of throat diameter 15 cm is fitted in a horizontal pipe of 30 cm diameter. Upstream and downstream pressure gauges show reading of 30N/cm^2 and 15N/cm^2 respectively. Calculate the discharge of water through pipe if $C_d=0.96$. 8
 (c) Explain the working principle of an orifice meter. 5
2. (a) Derive the expression for velocity distribution of viscous fluid through a circular pipe and also show the shear stress and velocity distribution. 8
 (b) A laminar flow takes place in a pipe of diameter 25 cm. The average velocity is 1.2m/s. Find the radius at which this occurs. Also calculate the velocity at 5cm from the wall of the pipe. 7
 (c) Write a short note on 'Stokes Law' 5
3. (a) What are the different losses in pipe flow? 6
 (b) Derive the expression for head loss due to sudden enlargement in pipe. 8
 (c) A horizontal pipe of diameter 400 mm is suddenly contracted to a diameter of 200 mm and pressure in the both pipe are 15 N/cm^2 and 10 N/cm^2 respectively. Find the head loss due to sudden contraction if $C_c=0.66$. 6
4. (a) What is open channel flow? Derive the expression for the discharge through an open channel by Chezy's formula. 8
 (b) What is specific energy? Draw the specific energy curve. 6
 (c) What is most economical channel? Find the condition for a rectangular channel. 6
5. (a) Draw a schematic of hydro electric power plant with reaction turbine and show its major components. 7
 (b) A Pelton wheel having tangential velocity 50 m/s operates under a net head of 700 m. Bucket deflects at 165° and discharges 100 liter per second. Determine power available at nozzle inlet and hydraulic efficiency of the turbine if coefficient of velocity is 0.96. Draw velocity triangles. 8
 (c) What is draft tube? 5
6. (a) What is momentum principle? Explain it. 5
 (b) Derive the expression for the force exerted by a flowing fluid on a pipe-bend. 8
 (c) A 300 mm diameter pipe carries water under a head of 25 meters with a velocity of 4m/s. If the axis of the pipe turns 60° , find the magnitude and direction of the resultant force at the bend. 7
7. Write short note on (any FOUR) 4 X 5 =20
 (a) Pitot tube and pitot-static tube
 (b) Hydraulic Gradient line and Total Energy Line
 (c) Working principle of centrifugal pump.
 (d) Specific speed of a turbine
 (e) Hydraulic jump
 (f) Moody's diagram