

Code: 9A01308

II B.Tech I Semester (R09) Regular & Supplementary Examinations, November 2011  
FLUID MECHANICS & HYDRAULIC MACHINERY  
(Electrical & Electronics Engineering)

Time: 3 hours

Max Marks: 70

3

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Show that the fluid pressure always acts normal to a surface.  
(b) Give a complete classification of different types of manometers (do not give sketches) mentioning the conditions for which each type of manometer is suitable.
- 2 (a) (a)What is the difference between momentum equation and impulse momentum equation.  
(b) A 30 cm diameter pipe carries water under a head of 15 metres with a velocity of 4 m/s. If the axis of the pipe turns through  $45^\circ$ , find the magnitude and direction of the resultant force at the bend.
- 3 (a) Define and explain the terms: (i) Hydraulic gradient line. (ii) Total energy line.  
(b) An oil of Kinematic Viscosity 0.5 stoke is flowing through a pipe of diameter 300 mm at the rate of 320 litres per sec. Find the head lost due to friction for a length of 60 m of the pipe.
- 4 A jet of water having a velocity of 20m/sec strikes a curved vane, which is moving with a velocity of 10m/sec. The jet makes an angle of  $200^\circ$  with the direction of motion of vane at inlet and leaves at an angle of  $130^\circ$  to the direction of motion of the vane at outlet. Draw the velocity triangles and calculate  
(a) Vane angles, so that the water enters and leaves the vane without shock.  
(b) Work done per second per unit weight of water striking the vane.
- 5 (a) Write short on the (i) Necessity of Storage and pondage and (ii) Stream flow Data requirement in Hydropower plants.  
(b) The designed capacity of a hydropower plant is  $1.32 \times 10^5$  KW. If the power generated in the plant is  $9 \times 10^4$  KW, find the efficiency of the plant. If the peak discharge is 1.5 times the normal discharge, determine the plant capacity, plant factor and total energy produced in a year.
- 6 (a) Explain the design specifications of a Pelton wheel.  
(b) A Pelton wheel has a tangential velocity of buckets of 15 m/sec. The water is being supplied under a head of 36m at the rate of 20 lit/sec. The bucket deflects the jet through an angle of  $160^\circ$ . If the coefficient of velocity of the nozzle is 0.98, find the power product by the turbine.
- 7 (a) Define specific speed of a turbine and derive an expression for the same.  
(b) Show that Pelton turbine is a low specific speed turbine.
- 8 (a) Discuss in general the important operating characteristics of an axial flow pump.  
(b) Define and derive an expression for the specific speed of a pump. How does specific speed help in pump selection?

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