

Code: R7220304

**R07**

B.Tech II Year II Semester (R07) Supplementary Examinations, April/May 2013

**FLUID MECHANICS AND HYDRAULIC MACHINERY**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Explain any four properties of fluids.  
(b) What are differential manometers? Explain in brief.
- 2 (a) Derive continuity equation for one dimensional flow.  
(b) A pipe of diameter 500 mm carries water at a velocity of 30 m/s. The pressure at the points A and B are given as  $29.43 \text{ N/cm}^2$  and  $22.563 \text{ N/cm}^2$  respectively, while the datum head at A and B are 26 m and 28 m. Find the loss of head between A and B.
- 3 Find the discharge of water flowing through a pipe 30 cm diameter placed in an inclined position where a venturi meter is inserted, having a throat diameter of 15 cm. The difference of pressure between the main and throat is measured by a liquid of  $G = 0.6$  in an inverted U-tube which gives a reading of 30 cm. The loss of head between the main and the throat is 0.3 times the kinetic head of the pipe.
- 4 (a) Prove that the force exerted by a jet of water on a fixed semi-circular plate in the direction of the jet when the jet strikes at the centre of the semi-circular plate is two times the force exerted by the jet on a fixed vertical plate.  
(b) A jet of water of diameter 80 mm moving with a velocity of 30 m/s strikes a fixed plate in such a way that the angle between the jet and plate is  $60^\circ$ . Find the force exerted by the jet on the plate in the direction normal to the plate and in the direction of the jet.
- 5 What is meant by hydro electric scheme and explain the various types of plants?
- 6 Explain pelton wheel in detail with a neat sketch.
- 7 (a) Explain governing of turbines.  
(b) A turbine develops 9000 KW when running at 10 rpm. The head on the turbine is 25 m. If the head on the turbine is reduced to 16 m, find the speed and power developed by the turbine.
- 8 A centrifugal pump has the following dimensions:  
Inlet radius = 84 mm, outlet radius = 168 mm, width of impeller at the inlet = 50 mm,  $\beta_1 = 0.45$  radians,  $\beta_2 = 0.25$  radians, width of impeller at outlet = 50 mm. Assuming shock less entry determine the discharge and the head developed by the pump when the impeller rotates at 90 radians/second.

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