

Code: R7210202

**R7**

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

**FLUID MECHANICS AND HYDRAULIC MACHINERY**

(Electrical and Electronics Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) Explain about manometers.  
(b) In a pipeline water is flowing. A manometer is used to measure the pressure drop for flow through the pipe. The difference in level was found to be 20 cm. If the manometric fluid (density =  $1.596 \text{ gm/cm}^3$ ), find the pressure drop. If the manometric fluid is changed to mercury (density =  $13.6 \text{ gm/cm}^3$ ) What will be the difference in level.
- 2 A 6 m long pipe is inclined at an angle of  $20^\circ$  with the horizontal. The smaller section of the pipe which is at lower level is of 100 mm diameter and the large section of the pipe is of 300 mm diameter. If the pipe is uniformly tapering and the velocity of water at the smaller section is 1.8 m/s, determine the difference of pressures between the two sections.
- 3 A pipe 5 cm diameter is 5 m long and carries a discharge of  $0.005 \text{ m}^3/\text{s}$ . Find the loss of head due to friction. The central 2 m length of the pipe is next replaced by a pipe 7.5 cm diameter, the changes of section being sudden. Find the loss of head and the corresponding power due to adoption of this alternative. Take  $f = 0.01$  for the pipe of both diameters and contraction loss coefficient = 0.5.
- 4 A 8 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at  $45^\circ$  to the axis of the jet. Find the normal force exerted on the plate.  
(i) When the plate is stationary and when the plate is moving with a velocity of 15 m/s in the direction of jet away from the jet. Also find the efficiency when the plate is moving.
- 5 List out the various elements of hydro electric power station and explain any two elements in detail.
- 6 A reaction turbine works at 450 rpm under a head of 120 m. Its diameter at inlet is 120 cm and the flow area is  $0.4 \text{ m}^2$ . The angles made by the absolute and relative velocities at inlet are  $20^\circ$  and  $60^\circ$  respectively with the tangential velocity. Find the volume flow rate, the hydraulic power developed and the efficiency. Assume whirl at outlet to be zero.
- 7 (a) What is meant by governing of turbines?  
(b) What are unit quantities?
- 8 A centrifugal pump delivers water against a net head of 14.5 m and a design speed of 1000 r.p.m. The vanes are curved back to an angle of  $30^\circ$  with the periphery. The impeller diameter is 300 mm and outlet width is 50 mm. Find the discharge of the pump if manometric efficiency is 95%.

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