

Code No: R21021

R10**SET - 1****II B. Tech I Semester Supplementary Examinations, May/June - 2017****FLUID MECHANICS AND HYDRAULICS MACHINES**

(Com. to EEE, ME, MM)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) Distinguish between a micro manometer and a differential manometer (6M)  
b) The two limbs of a U - tube differential manometer are connected to horizontal (9M)  
pipes. A and B carrying water. A is 1 m above B. If the level of mercury  
connected to A is higher than that connected to B by 10 cm, find the difference in  
pressure head between water in pipes A and B.
2. a) State and derive Bernoulli's theorem, mentioning clearly the assumptions (6M)  
underlying it.  
b) A 30 cm diameter horizontal pipe terminates in a nozzle with the exit diameter (9M)  
of 7.5 cm. If the water flows through the pipe at the rate of  $0.15 \text{ m}^3/\text{s}$ . What force  
will be exerted by the fluid on the nozzle?
3. a) Explain how the following flow problems are analyzed. (7M)  
i) Series pipe connection  
ii) parallel pipe connection and  
iii) Equivalent pipe connection.  
b) The rate of flow of water through a horizontal pipe is  $0.25 \text{ m}^3/\text{s}$ . The diameter of (8M)  
the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity  
in the smaller pipe is  $11.772 \text{ N/cm}^2$ . Determine: i) loss of head due to sudden  
enlargement, ii) pressure intensity in the large pipe, iii) power lost due to  
enlargement.

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4. a) Draw and explain velocity triangles at inlet and outlet for different cases in which a jet of water striking the flat and curved vanes. (8M)
- b) A jet of water, having a velocity of 30 m/s impinges on a series of vanes with a velocity of 15 m/s. The jet makes an angle of  $30^\circ$  to the direction of motion of vanes when entering and leaves at an angle of  $120^\circ$ . Sketch velocity triangles at entrance and exit, and determine the vane angles, so that the water enters and leaves without shock. (7M)
5. a) Draw a typical layout of a hydro power plant and discuss different elements. (8M)
- b) What are power canals? How these are different from irrigations canal (7M)
6. a) Draw a neat diagram of Kaplan turbine and explain its working. State important equations. (8M)
- b) Explain in detail, how you find the efficiency of draft tube. (7M)
7. a) Distinguish between specific speed and unit speed of a turbine. (8M)
- b) Why is governing of turbine required? Discuss how the turbines are governed with neat sketches. (7M)
8. a) Discuss the concept of multistage pumps in detail. (8M)
- b) A centrifugal pump has three stages discharging 120 lit/s, working against a head of 45 m, running at 1400 rpm. Calculate the specific speed of the pump. (7M)