

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)