Code No: RT22034 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November-2017
FLUID MECHANICS AND HYDRALIC MACHINERY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) Define viscosity and explain the prominence of Newton's law of viscosity.
   b) What do you understand by vorticity?
   c) What is a bluff body? List out its applications.
   d) How is the selection of pumps made?
   e) What is a surge tank? What is the prominence of surge tank? (6M+4M+4M+4M+4M)

PART-B

2. a) Give a brief note on mechanical gauges.
   b) A triangular plate of base width 2 m and height 2.5 m immersed in water with the apex downwards. The base of the plate is 1 m below and parallel to the free water surface. Calculate the total pressure on the plate and the depth of centre of pressure. (8M+8M)

3. a) State and prove Bernoulli's theorem. Mention its limitations.
   b) Drive an expression for head loss due to sudden enlargement of a pipe. (8M+8M)

4. a) Define Euler number, Weber number, Mach number and Froude number and explain the importance of these numbers.
   b) A thin plate is moving in still atmospheric air at a velocity of 5m/sec. The length of the plate is 0.6m and width 0.5m. Calculate the thickness of boundary layer at the end of the plate. Take density of air as 1.25 kg/m^3 and kinematic viscosity is 0.15 stokes. (8M+8M)

5. a) Derive the expression for force of jet impinging on a moving curved vane.
   b) A jet of water having a velocity of 45 m/s impinges without shock on a series of vanes moving at 15 m/s. The direction of motion of the vanes is inclined at 20^0 to that of jet, the relative velocity at outlet is 0.9 of that at inlet and absolute velocity of water at exit is to be normal to the motion of vanes. Find:
   i) Vane angles at inlet and outlet and
   ii) Work done on vanes per N (newton) of water supplied by jet. (8M+8M)

6. a) What equation is employed to find the work done by the impeller of a centrifugal pump. Derive the equation for work done.
   b) What are the equations for work done and discharge of a reciprocating pump? Define the slip and coefficient of discharge of a reciprocating pump. (8M+8M)

7. a) A Pelton wheel is working under a head of 50 m and the discharge is 0.85 m^3/sec. The mean bucket speed is 15m/sec. Find the power produced if the jet is deflected by the blades through an angle of 155^0 . The coefficient of velocity is 0.98.
   b) Explain the working, advantages, limitations and applications of hydraulic lift. (8M+8M)
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