Code No: R1621034 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2019
FLUID MECHANICS & HYDRAULIC MACHINES
(Com to ME & Mining Engineering)

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 **FOUR** Questions from **Part-B**

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PART –A

1. a) If the pressure at appoint below the sea is 137.7 KN/m^2 what is the pressure 30m below this point. Specific weight of ocean water is 10.06 KN/m^2. (3M)
   b) Write the difference between steady flow and uniform flow (2M)
   c) Name some dimensionless numbers. (2M)
   d) What are the forces exerted by a jet on moving plates. (2M)
   e) Write a note on NPSH. (3M)
   f) What is the example for Impulse Turbine? (2M)

PART -B

2. a) Differentiate between U-tube and Differential Manometer With a neat sketch. (7M)
   b) Calculate the shear stress developed in oil of viscosity 1.4 poise, used for lubricating the clearance between a shaft of diameter 15 cm and its journal bearing. The shaft rotates at 175 rpm and clearance is 1.5 mm. (7M)

3. a) The velocity potential function is given by Ø = $4(x^2 - y^2)$. Calculate the velocity components at the point (2, 3). (6M)
   b) State the momentum equation; In what way does it differ from impulse momentum equation. Mention some of its engineering applications. (8M)

4. a) Explain the significance of dimensionless numbers in dimension analysis. (6M)
   b) Find the displacement thickness, the moment thickness and the energy thickness for the velocity distribution in the boundary given by $u/U = (y/\delta)^{0.22}$ where u is the velocity at a distance y from the plate and u=U at y=δ, where δ = boundary layer thickness. (8M)

5. a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet. (7M)
   b) A jet of water of diameter 60 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 55^0. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet. (7M)
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6. a) The internal and external diameters of the impeller of a centrifugal pump are 200 mm and 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radically and velocity of flow is constant. Determine the work done by the impeller per unit weight of water. (8M)
   b) Compare Reciprocating pump with Centrifugal pump. (6M)

7. a) A Pelton wheel generates 8000KW under a net head of 130 m at a speed of 200 rpm. Assuming the coefficient of velocity for the nozzle 0.98, hydraulic efficiency 87%, speed ratio 0.46 and jet diameter to wheel diameter ratio is 1/9. Determine (8M)
   (i) Discharge required (ii) Diameter of the wheel
   (iii) Diameter and number of jets required
   (iv) Specific speed; Mechanical efficiency is 75%
   b) Define the term 'Governing of a turbine'. Describe with a neat sketch the working of an oil pressure governor. (6M)