Code No: R1621016 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2018
FLUID MECHANICS
(Civil 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) Define specific volume and specific gravity of a fluid.
   b) What is center of pressure?
   c) What are the applications of momentum equation?
   d) Differentiate smooth and rough flows.
   e) Define Vena-contracta
   f) Define drag and lift force of an object immersed in a liquid.

PART -B

2. a) Calculate specific weight, density and specific gravity of two liters of a liquid which weigh 15 N.
   b) Define pressure. Obtain an expression for the pressure intensity at a point in a fluid.
3. a) Differentiate between:
   (i) Steady and Unsteady flow
   (ii) Uniform and non uniform flow
   (iii) Laminar and turbulent flow
   (iv) Rotational and irrotational flow
   b) Derive the equation of continuity for one dimensional flow of an incompressible fluid.
4. a) Write Euler's equation of motion long a streamline and integrate it to obtain Bernoulli's equation. State all assumptions made.
   b) What are the surface and body forces associated with fluid flow? How are they incorporated in Euler's equation?
5. a) What are hydraulic grade line and total energy line? How do you draw the same?
   b) What do you mean by pipe in series and pipes in parallel?
6. a) Define velocity of approach. How can you account for it while computing the discharge over weirs?
   b) A pitot-tube is inserted in a pipe of 300mm diameter. The static pressure in pipe is 100mm of mercury (vacuum). The stagnation pressure at the center of the pipe, recorded by the pitot tube is 0.981N/cm^2. Calculate the rate of flow of water through pipe, if the mean velocity of flow is 0.85 times the central velocity. Take C_v=0.98.

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7. a) Define boundary layer and explain the fundamental causes of its existence. Also discuss the various methods of controlling the boundary layer.

   b) It is required to determine the frictional drag of a submarine. The length of the hull is 75m and its surface area is $3000m^2$. The submarine is travelling at a constant speed of 5m/s. critical Reynolds number at which the flow in the boundary layer changes from laminar to turbulent is 5×10^5. Assuming that the boundary layer at the leading edge is laminar, obtain the frictional drag and the power required to propel the submarine at 5m/s. take $\upsilon = 1 \times 10^{-6} m^2/s$ and $\rho = 1000 kg/m^3$.

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