

B.TECH SEM – IV (2007 COURSE) (CIVIL ENGG.) :

WINTER - 2017

SUBJECT : FLUID MECHANICS – I

Day : **Friday**
Date : **24/11/2017**

Time : **02.30 PM TO 05.30 PM**
Max. Marks : **80**

W-2017-2404

N.B.

- 1) Q.1 and Q.5 are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Use of non-programmable calculator is allowed.
- 5) Assume suitable data if necessary and state it clearly.

SECTION – I

- Q.1**
- a) What is Stable, Unstable and Neutral equilibrium of a floating body? **(05)**
 - b) What are Newtonian and Non Newtonian fluids? **(05)**
 - c) What are Dynamic and Kinematic Viscosity of fluids? **(04)**
- Q.2**
- a) Prove that $BM = \frac{I}{V}$ **(06)**
 - b) What are Metacentre and Metacentric Height? **(07)**
- Q.3**
- a) What is Uniform, Non uniform, Steady and Unsteady flow? **(06)**
 - b) Water is flowing through a pipe having diameter 600 mm and 400mm at the bottom and upper end respectively. The pressure intensity at bottom end is 350kN/m² and at upper end is 100kN/m². Determine the difference between datum head if rate of flow through pipe is 0.05 m³/sec. **(07)**
- Q.4**
- a) State and Explain Buckingham's π theorem **(06)**
 - b) The pressure drop ΔP in a pipeline of diameter D and length L depends upon density ρ , viscosity μ of the flowing fluid, mean velocity v, and average height of roughness projections k. Obtain an expression for ΔP . **(07)**

SECTION – II

- Q.5**
- a) What is Reynold's Experiment? **(05)**
 - b) What are major and minor head losses in a pipe line? **(04)**
 - c) What are Instantaneous Velocity and Temporal Mean Velocity? **(05)**
- Q.6**
- a) What are characteristics of Laminar flow? **(06)**
 - b) Derive expression for Hydraulic Power Transmission by pipe line **(07)**
- Q.7**
- a) What are Momentum Thickness and Displacement Thickness? **(06)**
 - b) What are methods of controlling separation of Boundary Layer? **(07)**
- Q.8**
- a) Explain Prantl's Mixing Length Theory **(06)**
 - b) What is Hydro dynamically Rough and Smooth Boundary? **(07)**

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