

**B.TECH SEM – IV (2007 COURSE) (CIVIL ENGG.) : SUMMER -
2018**

SUBJECT: FLUID MECHANICS-I

Day: **Tuesday**
Date: **12/06/2018**

S-2018-2609

Time: **10.00 AM TO 01.00 PM**
Max Marks: 80

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) Define and state the units of mass density and specific weight (05)
 - b) Derive continuity equation for one dimensional flow. (05)
 - c) What are types of models? (04)
- Q.2**
- a) What is dynamic and kinematic viscosity of fluids? (06)
 - b) A circular plate of 2.5 m dia. is immersed in water vertically. The centre of the plate is at 3 m below the free surface of water. Find total pressure on one side of plate and centre of pressure. (07)
- Q.3**
- a) What is H.G.L. & T.E.L.? (06)
 - b) Two pipes of 10cm and 20cm in dia, carry an incompressible fluid at 1.5m/s and 2m/s respectively. If the combined discharge is to be passed through a 25 cm dia pipe, Find the velocity in 25 cm dia pipe. (07)
- Q.4**
- a) What precaution should be taken while selecting repeating variable in Buckingham π theorem. (06)
 - b) Resistance R to the motion of aircraft of length 'L' moving with velocity V in air of mass density ρ , depends upon viscosity ' μ ' and bulk modulus of air 'K' of air, using π theorem obtain an expression for 'R' (07)

SECTION-II

- Q.5**
- a) State and explain Dupit's Equation. (05)
 - b) Define momentum thickness and Energy thickness. (05)
 - c) What are characteristics of turbulent flow? (04)
- Q.6**
- a) Explain Reynold's Experiment for Laminar Flow. (06)
 - b) Show that maximum efficiency of hydraulic power transmission through pipe line is 66%. (07)
- Q.7**
- a) What are hydro dynamically rough and smooth boundaries? (06)
 - b) For the velocity distribution $\frac{u}{U} = 2(y/\delta) - (y/\delta)^2$ (07)
Find the energy thickness δ^{**}
- Q.8**
- a) Explain Prandtl's Mixing length theory. (06)
 - b) Discuss the outcomes of Nikuradse's Experiment. (07)

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