

Roll No. ....

**24066**

**B. Tech 3rd Semester (Civil)  
Examination – December, 2017**

**FLUID MECHANICS - I**

**Paper : CE-205-F**

***Time : Three Hours ] [ Maximum Marks : 100***

***Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.***

**Note :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. Explain the following : 4 × 5 = 20

- (a) Real & Ideal Fluid (Liquid).
- (b) Free and ideal Fluid.
- (c) Differential and sensitive monometers.
- (d) Newtonian and Newtotian Fluid.

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### UNIT - I

2. (a) Differentiate between stream function and velocity potential function. 10
- (b) The stream function for the two dimensional flow is given by  $\psi = 2xy$ . 10
  - (i) Calculate the velocity component in  $x$  and  $y$  direction at a point  $2xy$ .
  - (ii) Find the velocity potential function.
3. (a) With the help of a neat sketch explain the following: 10
  - (i) Simple monometer.
  - (ii) U-tube monometer.
- (b) Derive an equation for the capillary rise of water in a glass tube immersed in it. 10

### UNIT - II

4. Show that a cylindrical box of 1m dia and 2m height is weighing 7.848 KN will not float vertically in sea water of density 1030 kg/m<sup>3</sup>. Find the force necessary in a vertical chain attached at the centre of the base of the box that will keep it vertical. 20
5. Derive Bernoulli's equation for fluid from the first principle. 16
6. (a) What do you understand by boundary layer separation ? What is the effect of pressure gradient on the boundary layer separation ? 10

### UNIT - III

24066-4950-(P-3)(Q-9)(17) ( 2 )

- (b) State and explain Buckingham's Theorem. Why this theorem's considered superior over Rayleigh method of dimensional analysis ? 10
7. Explain the various important numbers used in model analysis along with their significance. 16

### UNIT - IV

8. A spillway 7.2 m high and 150 m long discharges 2150 m<sup>3</sup>/sec under a head of 16 m. If a 1 : 16 model of spillway is to be constructed, find the model dimensions, head over the model discharge. 20
9. Write short notes on : 10 + 10
  - (i) Geometric Kinematic and dynamic similarity.
  - (ii) Physical modelling, dimensional analysis.

24066-4950-(P-3)(Q-9)(17) ( 3 )