

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 Newtonian 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  $y = 2xy$ .  
(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 :  
(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
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

### UNIT - III

6. (a) What do you understand by boundary layer separation ? What is the effect of pressure gradient on the boundary layer separation ? 10

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- (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 um. 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.

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