Roll No. ....

24066

B.Tech. 3rd Sem. (Civil Engg.)
Examination – December, 2012

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 : Question No. 1 is compulsory. Students have to attempt five questions in total, at least one question from each section. All carry equal marks.

1. Explain the following :   20

   (i) Real and ideal fluid.

   (ii) Free and forced vertex flow.

   (iii) Bernoulli's equation

   (iv) Buckingham theorem

   (v) Similar and distorted models.

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SECTION – A

2. (a) Define the fluid. Explain the various properties of fluid in detail. **10**

   (b) Explain the steady and unsteady, uniform and non-uniform flow in detail. **10**

3. A two dimensional flow is described by no velocity components : **20**

   $$u = 5 \times 3 \text{ and } v = -15x^2 y$$

   Evaluate the stream function, velocity and acceleration at point $p(x = 1m \text{ and } y = 2m)$

SECTION – B

4. A piece of wood (specific gravity = 0.6) of 10 cm square m cross section and 2.5 m long floats in water. How much head (specific gravity = 12) need to be fastened at the low end of the Shok so that it floats upright with 0.5 m length out of water. **20**

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5. A cylindrical buoy is 2m in diameter and 2.5 m long and weight 21.5 Km. The specific weight of sea water is 10 Km/ m^3. Show that the buoy does not float with it axis vertical. What minimum buel should be applied to chain attached to the centre of the base to keep the buoy vertical ? 20

SECTION – C

6. The velocity distribution in laminar boundary layer over a flat plate is assumed as $u = a \sin (by) + c$, where a, b, c are constants. Apply the appropriate boundary conditions and find out the velocity distribution law. 20

7. Explain the constructional detail and working of pitot tubes, ventorimeter, orifice meter and flow through orifices and mouth pieces in detail. 20

SECTION – D

8. What is Buckingham theorem ? Explain the important dimension less numbers and their significance in detail. Also explain the similar and distorted models. 20

9. Write short notes on the following :

   (i) Geometric, kinematic and dynamic similarity. 10

   (ii) Physical modelling, dimensional analysis. 10

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