Total No. of Questions : 8] [Total No. of Printed Pages : 2

Roll No. .....

ME–505(O)

B. E. (Fifth Semester) EXAMINATION, June, 2010

(Old Scheme)

(Mechanical Engg. Branch)

FLUID MECHANICS

[ME–505(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. Assume suitable data if necessary. Draw neat and clean diagram if necessary.

1. (a) What do you understand by Hydraulic law ? 10
   (b) Differentiate between the following : 10
   (i) Absolute and Gauge pressure
   (ii) Simple manometer and differential manometer

2. (a) Discuss the buoyancy, metacentre and metacentric height. 10
   (b) Determine the total pressure on a circular plate of diameter 2·0 m placed vertically in water in such a way that the centre of plate is 3 m below the free surface of water. Find the position of centre of pressure. 10

3. Derive the expression for continuity equation in three dimensions, its differential and integral form. 20

4. A fluid flow field is given by : 20

$$V = x^2y\,i + y^2z\,j - (2xyz + yz^2)\,k$$

Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at point (2, 1, 3).

5. (a) Explain the principle of venturimeter with a neat sketch, expression for the rate of flow of fluid through it. 10
   (b) Discuss the merits and demerits of venturimeter with respect to orifice meter. 10

6. (a) The water flowing through a pipe having diameters 20 cm and 10 cm at entrance and exit section respectively. The rate of flow through pipe is 35 litres per second. The entrance is 6 m above datum and exit section 4 m above datum. If the pressure at entrance is 40 N/cm^2 find the intensity of pressure at exit. 10
   (b) What is Euler's equation of motion ? How will you obtain Bernoulli's equation from it ? 10

7. (a) What are the methods of dimensional analysis ? State Buckingham's π theorem. 10
   (b) Derive the equation of stream function for source flow. Also plotting the stream line for source flow. 10

8. (a) Discuss the various losses of energy in pipe flow. 10
   (b) Derive the expression for the displacement thickness. What do you understand by boundary layer ? 10