

Roll No.

24066

B. Tech. 3rd Semester (Civil Engg.)

Examination – December, 2015

FLUID MECHANICS - I

Paper : CE-205-F

Time : Three Hours]

[Maximum Marks : 100

Before answering the question, 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 any *five* questions. All questions carry equal marks.

1. (a) Write short notes on :

(i) surface tension,

(ii) capillarity,

(iii) real and ideal fluids.

10

(b) Write short notes on :

10

(i) Pressure inside a droplet and bubble due to surface tension.

(ii) Newtonian law of viscosity.

2. Obtain an expression of continuity in Polar coordinates. What is difference between stream line and path line ? 20

3. The horizontal 8 m long pipe is tilted at an angle of 35° . At the lower level, the section of pipe is of 90 mm diameter and the upper level of the pipe with large section is of 250 mm diameter. If the pipe is equally tapering and the velocity of water at the lower section is 1.5 m/s, calculate the difference of pressures between the upper and lower sections. 20

4. (a) Write short notes on differential manometers, Stability of floating body. 10

(b) Find the total pressure and position of center of pressure on a triangular plate of base 2 m and height 3 m which is immersed in water in such a way that the plan of the plate makes an angle of 60° with the free surface of the water. The base of the plate is parallel to the water surface and at a depth of 2.5 m from water surface. 10

5. A lubricating oil of specific gravity 0.85 and kinematic viscosity $10\text{cm}^2/\text{s}$ is pumped at a rate of 12 lit./s through two pipes in parallel, one 8 cm in diameter and other 10 cm diameter, both pipes being 1000 m long. Calculate the flow rate through each pipe and horse power of each pipe. 20

6. Determine the difference in the elevations between the water surfaces in two tanks which are connected by a horizontal pipe of diameter 300 mm and length 400 m. The rate of flow of water through the pipe is 300 lit./s. Consider all losses and take value of $f = 0.008$.

Also Draw Hydraulic gradient and Total energy lines. 20

7. Discuss the Buckingham theorem and important dimensionless numbers and their significance in detail. 20

8. Write short notes on : 10 + 10 = 20

(a) Friction coefficients for smooth and rough pipes.

(b) Velocity distribution in pipes.