

GANPAT UNIVERSITY

B.Tech.Sem. III (CIVIL) , Regular Examination – November / December: 2012

2CI – 305: Fluid Mechanics-I

Max.Time: 3 Hours

Max. Marks: 70

Exam. No. of the candidate: _____ Supervisor's dated initial: _____

- Instructions: -
- (1) Answer to the two sections must be written in separate answer books.
 - (2) Figures to the right indicate full marks.
 - (3) Assume suitable data if required.

Section - I

- 1 (A) Define the fluid properties. Density, Weight, Specific Volume and Specific gravity. 6
- (B) Explain the term capillarity and derive the equation for capillary rise and capillary fall. 6
- 2 (A) Explain: Different Types of Pressures. 6
- (B) Calculate the pressure due to a column of 0.5 m of (a) water, (b) an oil of sp. Gravity 0.8 and (c) mercury of sp. Gravity 13.6. Take density of water as 1000 Kg/m^3 . 5

OR

- 2 (A) Explain experimental method for finding out Meta-Centre height. 6
- (B) A uniform body of size 5 m long X 2.5 m wide X 2 m deep floats in water. What is the weight of the body if depth of immersion is 1.5 m? Determine the meta-centric height also. 5
- 3 Attempt any Three. 12
- (A) How would you determine the horizontal and vertical components of the resultant pressure on a submerged curved surface?
- (B) Determine the total pressure and centre of pressure of isosceles triangular plate of base 5 m and altitude 5m when the plate immersed vertically in an oil of sp. Gravity 0.8. The base of the plate is 1 m below the free surface of water
- (C) Derive the expression for the loss of head due to sudden contraction of a pipe.
- (D) Derive an expression for the discharge over a rectangular weir.

Section - II

- 4 (A) Define Cipolletti weir and derive equation for finding out discharge through it. 6
- (B) Determine the height of a rectangular weir of length 5 m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.5 m and discharge is 1.5 m^3 per second. Take $C_d=0.6$ and neglect end contraction. 6
- 5 (A) What are the hydraulic co-efficient? Explain in detail. 6

- (B) A closed vessel contains water up to height of 3.0 m and over the water surface there is air having pressure 9.292 N/cm^2 above atmospheric pressure. At the bottom of vessel there is an orifice of diameter 20 cm. find the rate of flow of water from orifice. Take $C_d = 0.62$.

OR

- 5 (A) Give classification of manometers. Explain any one in detail. 5
(B) A simple manometer is used to measure the pressure of oil flowing in a pipe line. Its right limb is open to atmosphere and left limb is connected to the pipe. The centre of the pipe is 9cm below the level of mercury in the right limb. If the difference of mercury level in the two limbs is 15 cm, determine the absolute pressure of the oil in pipe. (sp. Gravity of oil is 0.8) 6

6 Attempt any Three.

12

- (A) Derive the continuity equation for three dimensional flow
(B) Derive the equation of motion. And give the name of forces which not considered deriving Reynolds's equation of motion, Navier-stokes equation of motion & Euler's equation of motion
(C) Derive equations for finding out discharge through "Fully Submerged orifice".
(D) What is syphon? On which principal it works?

End of Paper