

GANPAT UNIVERSITY**B. TECH SEM-III (CIVIL ENGINEERING)****REGULAR EXAMINATION (CBCS) – NOV – DEC -2015****2CI305: FLUID MECHANICS I****Max. Time: 3 Hours****Max. Marks:60**

- Instruction:**
- 1 This questions paper has two sections. Attempt each section in separate answer book.
 - 2 Figures on right indicates marks.
 - 3 Be precise and to the point in answering the descriptive questions.

Section – I

- Q – 1** **A** State & prove Pascal's Law. **5**
- B** A U tube differential manometer connect two points A and B. Pipe A contains liquid having sp. gr. 1.6 under a pressure of 120 kPa. The pipe B contains oil of sp. gr. 0.8 under a pressure of 200 kPa. The pipe A lies 2.5 m above B. Find difference of pressure measured by mercury filled in U tube. The level of mercury in left limb is at the level of pipe B. **5**

OR

- Q – 1** **A** Explain Inverted U tube manometer. **5**
- B** One end of mercury differential manometer is attached to pipe A having diameter 30 mm, Specific gravity of liquid 1.1 and height of liquid column from mercury level is 300 mm. the other end is attached to pipe B having diameter 25 mm, Specific gravity of liquid 0.8 and height of liquid column 200 mm. If both the pipes are placed at the same level in horizontal. Find the pressure difference. **5**

- Q – 2** **A** The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1.0 m in 25 seconds. Also the coordinates of a point on the jet, measured from vena contracta are 4.3 m horizontal and 5.0 m vertical. Find C_d , C_c and C_v . **5**
- B** Find the discharge through a fully sub merged orifice of width 2 m if the difference of water level on both sides of the orifice be 50 cm. The height of water from top and bottom of the orifice are 2.5 m and 2.75 m respectively. Take $C_d = 0.6$. **5**

OR

- Q – 2** **A** An internal mouthpiece of 80 mm diameter is discharge water under a constant head of 8 m. Find discharge through mouthpiece, when (i) the mouthpiece is running free and (ii) the mouthpiece is running full. **5**
- B** Find out the discharge through a trapezoidal notch which is 1 m wide at the top and 0.40 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. Assume C_d for rectangular portion as = 0.62 while for triangular portion = 0.60. **5**

- Q - 3 A Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m through which water is flowing at a velocity of 3 m/s using (i) Darcy formula, (ii) Chezy's formula for which $C = 0.60$. Take kinematics viscosity for water = 1 stoke. 5
- B A main pipe divided into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1 m respectively. While the length and diameter of second parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe, if total flow in the main is $3 \text{ m}^3/\text{s}$. The coefficient of friction for each parallel pipe is same and equal to 0.005. 5

Section - II

- Q - 4 A Define the fluid properties. : Density, Viscosity, Specific Volume and Specific gravity, Specific Weight. 5
- B State and prove Bernoulli's Equation and list the assumptions which are made while deriving Bernoulli's equation. 5

OR

- Q - 4 A What is the difference between dynamic viscosity and kinematic Viscosity? How does viscosity of fluid vary with temperature? 5
- B What is Venturimeter? Derive an expression for the discharge through a Venturimeter. 5

- Q - 5 A A vertical rectangular gate of $4\text{m} \times 2\text{m}$ is hinged at a point 0.25 m below the centre of gravity of the gate. If the total depth of water is 7 m what horizontal force must be applied at the bottom to keep the gate closed? 5
- B How would you determine the horizontal and vertical components of the resultant pressures on a submerged curved surface? 5

OR

- Q - 5 A A stone weighs 490.5 N in air and 196.2 N in water. Determine the volume of stone and its specific gravity. 5
- B How will you determine the Meta centric height of floating body experimentally? Explain with neat sketch. 5
- Q - 6 A A pipe line carrying oil of specific gravity 0.8, changes in diameter from 300mm at a position A to 500mm diameter to position B which is 5m at a higher level. If the pressures at A and B are 19.62 N/cm^2 and 14.91 N/cm^2 respectively and the discharge is 150 lit/sec, determine the loss of head and direction of flow. 5
- B Derive Euler's equation of motion. 5