**20CE305**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **January, 2024** | **Civil Engineering** | | |
| **Third Semester** | **Fluid Mechanics** | | |
| **Time:** Three Hours | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | **(4X14=56 Marks)** |
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| 1. | Answer all questions | | | (1X14=14 Marks) | | |
|  | a) | | State Newton’s law of Viscosity. | | CO1 L2 1M | |
|  | b) | | One litre of crude oil weight is 9.6 N. Calculate its specific weight and specific gravity. | | CO1 L3 1M | |
|  | c) | | Differentiate between Gauge pressure and Absolute pressure? | | CO1 L4 1M | |
|  | d) | | List out different types of pressure measurements. | | CO1 L3 1M | |
|  | e) | | Differentiate between steady flow and uniform flow? | | CO2 L4 1M | |
|  | f) | | Define streak line and path line? | | CO2 L1 1M | |
|  | g) | | Why coefficient of discharge of venturimeter is greater than that of orifice meter? | | CO2 L1 1M | |
|  | h) | | State the principle of Pitot tube? | | CO2 L2 1M | |
|  | i) | | Differentiate between small and large orifice? | | CO3 L4 1M | |
|  | j) | | Define nappe and crest of the notch. | | CO3 L1 1M | |
|  | k) | | Find the coefficient of contraction of an orifice, when the coefficient of discharge and coefficient of velocity are 0.65 and 0.9. | | CO3 L3 1M | |
|  | l) | | Find the friction factor if the Reynolds’s number value is 1500. | | CO4 L2 1M | |
|  | m) | | Differentiate between major and minor losses? | | CO4 L4 1M | |
|  | n) | | Distinguish between H.G.L and T.E.L? | | CO4 L4 1M | |
| **UNIT-I** | | | | | | |
| 2. | a) | Show that the centre of pressure is always lies below the centre of gravity for a vertical submerged surface. | | | CO1 L2 | 7M |
|  | b) | A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is 100 mm below the level of mercury in the right limb. If the difference of mercury level in the two limbs is 160 mm, determine the absolute pressure of the oil in the pipe. | | | CO1 L3 | 7M |
| **(OR)** | | | | | | |
| 3. | a) | Describe the stability of submerged and floating bodies. | | | CO1 L2 | 7M |
|  | b) | A tank with vertical sides is square in plan with side 3.5 m long. It contains oil of specific gravity 0.9 to a depth of 1m floating on 0.75 m depth of water. Calculate the pressure on one side of the tank and also determine the height of centre of pressure above the base of tank. | | | CO1 L3 | 7M |
| **UNIT-II** | | | | | | |
| 4. | a) | Derive the three dimensional Continuity Equation in Cartesian coordinate system. | | | CO2 L2 | 7M |
|  | b) | The stream function for a two dimensional flow is given by ψ = 2 x y, calculate the velocity at the point (2, 3). Find the velocity potential function φ. | | | CO2 L3 | 7M |
| **(OR)** | | | | | | |
| 5. | a) | Derive the Bernoulli’s equation and mention the assumptions. | | | CO2 L2 | 7M |
|  | b) | A horizontal Venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of water. The pressure at inlet is 17.658 N/cm2 and the vacuum pressure at the throat is 30 cm of mercury. Find the discharge of water through Venturimeter. Take Cd=0.98. | | | CO2 L3 | 7M |
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| **UNIT-III** | | | | | | |
| 6. | a) | Derive the equation for discharge through a large rectangular orifice. | | | CO3 L2 | 7M |
|  | b) | A rectangular orifice 0.9 m wide 1.2m deep is discharging water from a vessel. The top edge of the orifice is 0.6 m below the water surface in the vessel. Calculate the discharge through the orifice if Cd=0.6 and percentage error if the orifice is treated as a small orifice. | | | CO3 L3 | 7M |
| **(OR)** | | | | | | |
| 7. | a) | Derive the equation for discharge through a triangular notch. | | | CO3 L2 | 7M |
|  | b) | Water flows over a triangular right angled notch first and then over a rectangular notch of 1 m wide. The discharge coefficients of the triangular and rectangular notches are 0.6 and 0.7 respectively. If the depth over the triangular notch is 360 mm, find the depth of water over the rectangular notch. | | | CO3 L3 | 7M |
| **UNIT-IV** | | | | | | |
| 8. | a) | Describe briefly Reynolds experiment with neat sketch in pipe flow? | | | CO4 L2 | 7M |
|  | b) | A 450 reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm2 and rate of flow of water is 600 litres/sec. | | | CO4 L3 | 7M |
| **(OR)** | | | | | | |
| 9. | a) | Derive an expression for head loss in a sudden expansion in the pipe. | | | CO4 L2 | 9M |
|  | b) | An oil of sp.gr 0.9 and viscosity 0.06 poise is flowing through a pipe of diameter 200mm at the rate of 60 litres/sec. Find the head lost due to friction for a 500m length of pipe. Find the power required to maintain this flow. | | | CO4 L3 | 5M |

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