**20CE305**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **March, 2022** | **Civil Engineering** | | |
| **Third Semester** | **Fluid Mechanics** | | |
| **Time:** Three Hours | | **Maximum:7**0 Marks | |
| *Answer Question No.1 compulsorily.* | | | (14X1 = 14 Marks) |
| *Answer ONE question from each unit.* | | | (4X14=56 Marks) |

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| 1. | a) | | Write the units of Dynamic viscosity. | CO1 |  |
|  | b) | | Find the pressure at depth of 1000 m below sea water if the specific gravity of sea-water is 1.03. | CO1 |  |
|  | c) | | Find the gauge pressure corresponding absolute pressure of 60 kPa. Assume Patm=100 kPa. | CO1 |  |
|  | d) | | Define meta centre. | CO2 |  |
|  | e) | | What are the types of fluid flow? | CO2 |  |
|  | f) | | Define stream function? | CO2 |  |
|  | g) | | List the different forces present in fluid flow. | CO3 |  |
|  | h) | | How to measure the velocity of flow in pipe? | CO3 |  |
|  | i) | | Differentiate between orifice and mouth piece. | CO3 |  |
|  | j) | | What are hydraulic coefficients? | CO3 |  |
|  | k) | | Define notch. | CO4 |  |
|  | l) | | Define Total energy line. | CO4 |  |
|  | m) | | What are the characteristics of turbulent flow? | CO4 |  |
|  | n) | | What do you understand by minor losses in pipes? | CO4 |  |
| **Unit - I** | | | | | |
| 2. | a) | State and Derive Pascal’s law. | | CO1 | 7M |
|  | b) | Pipes A and B are carrying water at a pressures of 100 kN/m2 and 200 kN/m2 respectively. Pipe B is located 2 m above pipe A. Find the deflection of mercury in mercury U-tube differential manometer when both the limbs are connected to both the pipes. | | CO1 | 7M |
| **(OR)** | | | | | |
| 3. | a) | Write the conditions of equilibrium of floating and submerged bodies. | | CO1 | 7M |
|  | b) | A cubical tank has sides of 1.5 m it contains water for the lower 0.6 m depth. The upper remaining part is filled with oil of specific gravity 0.9. Calculate for one side vertical of the tank:   1. Total pressure, and b) Position of center of pressure. | | CO1 | 7M |
| **Unit - II** | | | | | |
| 4. | a) | If for a two-dimensional potential flow, the velocity potential is given by Ø = x (2y-1). Determine the velocity at the point P(4,5) and the value of stream function ѱ at the point P. | | CO2 | 7M |
|  | b) | Derive an expression for Bernoulli’s equation. | | CO2 | 7M |
| **(OR)** | | | | | |
| 5. | a) | What is a Venturimeter? Derive the expression for the discharge through a Venturimeter. | | CO2 | 7M |
|  | b) | An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure measured by a mercury oil differential manometer on the two sides of orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil specific gravity0.9 when the Cd = 0.64. | | CO2 | 7M |
| **Unit - III** | | | | | |
| 6. | a) | Explain the classification of orifices and mouthpieces based on their shape, size and sharpness? | | CO3 | 7M |
|  | b) | A rectangular orifice 0.9mwide and1.2 m deep is discharging water from a vessel. The top edge of the orifice is0.6 m below the water surface in the vessel. Determine the discharge through orifice if Cd=0.6 and percentage error if the orifice is treated as a small orifice. | | CO3 | 7M |
| **(OR)** | | | | | |
| 7. | a) | Derive the discharge equation through a rectangular Notch. | | CO3 | 7M |
|  | b) | Water flows through a triangular right angled notch, first and then over a rectangular notch of 1 m width. The discharge coefficients of the triangular and rectangular notch are 0.6 and 0.7 respectively. If the depth of water over the triangular notch is 360 mm, find the depth water over the rectangular notch. | | CO3 | 7M |
| **Unit - IV** | | | | | |
| 8. | a) | Derive force exerted on a pipe bend? | | CO4 | 7M |
|  | b) | A 30 cm diameter pipe carries water under a pressure of 150 kPa meters with a velocity of 4 m/sec. If the axis of the pipe turns through 45o, find the magnitude and direction of the resultant force at the bend. | | CO4 | 7M |
| **(OR)** | | | | | |
| 9. | a) | Explain the working procedure of Reynold’s experiment. | | CO4 | 7M |
|  | b) | Determine the difference in the elevation between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300mm and length 400m The rate o flow of water through the pipe is 300 litres/s. Consider all losses and take the value of f= 0.008. | | CO4 | 7M |

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