**18CE305**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular / Supplementary) DEGREE EXAMINATION** | | | |
| **February,2021** | **Civil Engineering** | | |
| **Third Semester** | **Fluid Mechanics** | | |
| **Time:** Three Hours | | **Maximum :** 50 Marks | |
| *Answer ALL Questions from PART-A.* | | | (1X10 = 10 Marks) |
| *Answer* ***ANY FOUR*** *questions from PART-B.* | | | (4X10=40 Marks) |
| **Part - A** | | | |

**1.** Answer all questions (1X10=10 Marks)

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| a | A thin blade of steel can be made to float on water. Explain how this is possible |
| b | Distinguish between Specific weight and specific volume |
| c | Differentiate between cohesion and adhesion |
| d | What do you mean by the metacentric height |
| e | Differentiate between Path line and Streak line |
| f | Differentiate between nappe and crest |
| g | What do you understand by the terms boundary layer and boundary layer theory |
| h | State momentum equation and mention some of its engineering applications |
| i | List the causes of minor energy losses in flow through pipes |
| j | Define the Hydraulic Gradient Line and total energy line. |

**Part - B**

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| 2.a | Explain the phenomena of capillarity and surface tension with neat sketches | 5M |
| 2.b | The velocity distribution for flow over a flat plate is given by u= , where u is the point velocity in meter per second at a distance y meter above the plate. Determine the shear stress at y = 0 and 1m. Assume dynamic viscosity 0.4 poise. | 5M |

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| 3.a | Derive the expressions for the force exerted on submerged vertical plane surface by the static liquid and locate the position of centre of pressure.  psk1 | 5M |
| 3.b | An inverted differential manometer contains an oil of specific gravity 0.9 and connected to two different pipes, at different levels, carrying water under pressure as shown in fig 2.0. Determine the pressure in the pipe B if the pressure in the pipe A is 2.5 m of water. | 5M |

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| 4.a | State and derive continuity equation for incompressible fluid and compressible fluid.(3D) | 5M |
| 4.b | A pipe 50 cm in diameter branches into two pipes of diameters 25 cm and 20 cm respectively as shown in figure 4.0. It the average velocity in 50 cm diameter pipe is 4m/sec find i. Discharge through 50 cm diameter pipe and ii. Velocity in 20 cm diameter pipe if the average velocity in 25 cm pipe is 3 m/sec | 5M |

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| 5.a | Explain the principle of venturimeter with neat sketch? Derive an expression for the rate of flow of fluid through it. | 5M |
| 5.b | A submarine is fitted with a pitot-tube, moves horizontally in sea. The axis of the submarine is 12 m below the surface of water. The pitot-tube is fixed in front of the submarine along its axis. The pitot-tube is connected with U-tube differential manometer containing mercury, the reading of which is found to be 200mm. Find the speed of submarine. Take Cv = 0.98 | 5M |

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| 6.a | Explain the classification of orifices and mouthpieces bases on their shape, size and sharpness | 5M |
| 6.b | Derive an expression for the discharge over a triangular notch in terms of head of water over the crest of the notch. | 5M |

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| 7.a | What do you mean by boundary layer separation? What is the effect of pressure gradient on boundary layer separation? | 5M |
| 7.b | Find the displacement thickness, the momentum thickness and energy thickness for velocity distribution in the boundary layer given by , where u is the velocity at a distance y from the plate and u = U at y = δ, where δ is boundary layer thickness. also calculate the value of δ \*/ɵ | 5M |

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| 8.a | Derive Force exerted by a flowing fluid on a pipe- bend using Impulse-momentum equation | 5M |
| 8.b | A 300mm diameter pipe carries water under a head of 200m with a velocity of 3.5 m/s. If the axis of the pipe turns through 450, find the magnitude and direction of the resultant force at the bend. | 5M |

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| 9.a | What do you mean by the pipes in parallel and pipes in series? Why pipes are used in parallel? | 3M |
| 9.b | Determine the rate of flow of water through a pipe of diameter 100 mm and length 600 mm when one end of the pipe is connected to a tank and other end of the pipe is open to the atmosphere. The height of water in the tank from the centre of pipe is 50 mm. Pipe is given as horizontal and value of f is 0.01. Consider minor losses. | 7M |

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