Seat No.

MAR_APR 2026 SUMMER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Fluid Mechanics

Sub. Code: 63354/73207/77738

Day and Date: Tuesday ,19-05-2026 **Total Marks: 70**

Time: 10:30 AM To 01:00 PM

Instructions: 1. Draw neat labelled diagrams wherever necessary
2. Figures to the right indicate full marks
3. Use of Scientific calculator is allowed

Special Inst.: From each main question, solve any two sub-questions out of (A), (B) and (C)

Q1) A. Explain different types of fluids with a graph of shear stresses Vs Velocity gradient. **[6]**

B. Explain with neat sketch condition of equilibrium of submerged bodies. **[6]**

C. Two large plane surfaces are 2.4cm apart. The space between the surfaces is filled with glycerine. What force is required to drag a very thin plate of surface area $0.5m^2$ between the two large plane surfaces at a speed of 0.6m/s, if the thin plate is in middle of the two plane surfaces Take $\mu=0.81Ns/m^2$ **[6]**

Q2) A. Derive the three dimensional continuity equation in Cartesian coordinates. **[5]**

B. Define Convective and local acceleration. **[5]**

C. If for a two-dimensional potential flow, the velocity potential is given by $\Phi = x(2y-1)$ determine the velocity at the point P (4, 5). Determine also the value of stream function ψ at the point P. **[6]**

Q3) A. Derive the expression for discharge of venturimeter **[6]**

B. Derive the expression for Bernoulli's equation. **[6]**

C. A rectangular channel 1.5m wide has a discharge of $0.2m^3/s$, which is measured by right- angle V-notch-weir. Find the position of apex of the notch from the bed of channel if the maximum depth of water is not to exceed 1m. Assume Cd = 0.62 **[6]**

Q4) A. Derive the expression for force exerted by flowing fluid on a pipe bend. **[6]**

B. Derive the expression for velocity distribution of circular pipe. **[6]**

C. There is a horizontal crack 40 mm wide and 2.5 mm deep in a wall of thickness 100 mm. Water leaks through the crack. Find the rate of leakage of water through the crack if the difference of pressure between the two ends of the crack is $0.02943 N/cm^2$. Take the viscosity of water equal to 0.01 poise. **[6]**

Q5) A. Derive the Darcy- Weisbach equation for loss of head due to fluid friction in a circular pipe flow. **[5]**

B. Explain the following Terms **[5]**

i. Equivalent Pipe
ii. Syphon Pipe

C.

Find the diameter of a pipe of length 2000 m when the rate of flow of water through the pipe is 200 liters/s and the head lost due to friction is 4 m. Take the value of C = 50 in Chezy's formulae. **[6]**

Q6) A. Define the following terms **[6]**

i. Displacement Thickness
ii. Momentum Thickness
iii. Energy Thickness

B. Explain with neat sketch methods of preventing the separation of boundary layer. **[6]**

C. On a flat plate of 2m (length) x 1m(width), experiments were conducted in a wind tunnel with a wind speed of 50km/h. The plate is kept at such an angle that the coefficient of drag and lift at 0.18 and 0.9 respectively. Determine drag force, lift force and resultant force (take density of air = 1.15kg/m^3) **[6]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (1154) B.Tech. CBCS (73207) Fluid Mechanics Part 2 SEM 3
2] (101) Bachelor of Engineering (77738) Fluid Mechanics Part 2 SEM 3
3] (101) Bachelor of Engineering (63354) Fluid Mechanics Part 2 SEM 3

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