Seat No.

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OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Fluid Mech-I

Sub. Code: 63341/73200/77772

Day and Date: Monday ,08-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions: **1. Assume suitable data wherever necessary and mention it boldly**
2. Figures to the right indicate full marks

Special Inst.: **Q4 and Q8 are compulsory**
Attempt any three questions from each section

Q1) SOLVE THE FOLLOWING **[11]**

A. State Newtons Law of viscosity and Enlist Types of Fluid **[5]**

B. A plate 0.05 mm distant from a fixed plate moves at 1.2 m/s and requires a shear stress of 2.2 N/m^2 to maintain this speed. Find the viscosity of the fluid between the plates. **[6]**

Q2) SOLVE THE FOLLOWING **[12]**

A. Derive formula for Total Pressure and Centre of Pressure for Plane inclined surface immersed into liquid. **[6]**

B. A rectangular plate 3 meters long and 1 metre wide is immersed vertically in water in such a way that its 3 meters side is parallel to the water surface and is 1 metre below it. Find: (i) Total pressure on the plate, and (ii) Position of centre of pressure **[6]**

Q3) SOLVE THE FOLLOWING **[11]**

A. Define Stream Function and Velocity potential Function **[5]**

B. Given that, **[6]**

$u = -4ax\,(x^2 - 3y^2)$

$v = 4ay\,(3x^2 - y^2)$

Examine whether these velocity components represent a physically possible two-dimensional flow; if so whether the flow is rotational or irrotational?

Q4) Write a Short Note on (Attempt Any Three) **[12]**

A. Sp. Gravity and Bulk Density **[4]**

B. Buoyancy and Floatation **[4]**

C. Pressure Diagram **[4]**

D. Flow Net (Properties and uses) **[4]**

E. Stability Conditions for Floating bodies **[4]**

Q5) SOLVE THE FOLLOWING **[11]**

A. Write Bernoulli's Theorem Limitations and modifications **[5]**

B. A horizontal venturimeter with inlet diameter 200 mm and throat diameter 100 mm is employed to measure the flow of water. The reading of the differential manometer connected to the inlet is 180 mm of mercury. If the co-efficient of discharge is 0.98, determine the rate of flow. **[6]**

Q6) SOLVE THE FOLLOWING **[12]**

A. Explain Concept of Separation of Boundary Layer **[6]**

B. Water flowing through a 2 cm dia pipe. The shear stress at a point 4 mm from the axis is 0.1 N/cm^2 Assuming flow to be viscous Calculate shear stress at Pipe wall **[6]**

Q7) SOLVE THE FOLLOWING **[11]**

A. What do you mean by Concept of Equivalent Pipe **[5]**

B. Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths 450 m, 255 m and 315 m respectively are connected in series. The difference in water surface levels in two tanks is 18 m. Determine the rate of flow of water if coefficients of friction are 0·0075, 0·0078 and 0·0072 respectively Neglecting minor losses. **[6]**

Q8) Write a Short Note on (Attempt Any Three) **[12]**

A. Mouthpiece and Rotameter **[4]**

B. Laminar Flow and Turbulant Flow **[4]**

C. Major and Minor Losses **[4]**

D. Control of Seperation of Boundary layer **[4]**

E. Hydraulically Smooth and Rough Boundaries **[4]**

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] (101) Bachelor of Engineering (77772) Fluid Mech-I Part 2 SEM 3

2] (1154) B.Tech. CBCS (73200) Fluid Mech-I Part 2 SEM 3

3] (101) Bachelor of Engineering (63341) Fluid Mech-I Part 2 SEM 3