

BACHELOR OF VOCATION**Solar Technology****Subject: Fluid Mechanics****Subject Code: ME-605****Semester: Third****January 2021****Theory (External): 35 Marks****Time: 03 Hours****Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number

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SECTION -A (SHORT/OBJECTIVE TYPE QUESTIONS)

(10x1=10 Marks)

- A. A fluid is a substance which
- Cannot withstand any shear force
 - Cannot remain at rest under the action of a shear force
 - Flows in the absence of external force
 - Is incompressible and inviscid
- B. The velocity gradient in the transverse direction for a fluid flow equals
- The pressure gradient in the flow
 - The rate of shear strain
 - The stress at a point
 - The strain at a point
- C. A U – tube manometer
- Is used upright if pressure difference is small
 - Is used inclined if pressure difference is small
 - Must be fitted with a well for the sake of accuracy
 - None of the above
- D. The buoyant force acting on a floating body passes through the
- Metacenter of the body
 - Center of gravity of the body
 - Centroid of volume of body
 - Centroid of the displaced volume
- E. Center of pressure of submerged horizontal plane is
- Above the center of gravity of the plane
 - Below the center of gravity of the plane
 - Coincide with the center of gravity of the plane
 - None of the above.

F. A stream line is a line

- a) Drawn normal gives direction of velocity
- b) Stream line divide the passage in equal numbers of parts.
- c) Tangent to which gives direction of velocity vector.
- d) None of the above

G. The equation of continuity in fluid mechanics is

- a) Energy equation
- b) Momentum equation
- c) Conservation of mass equation
- d) Angular momentum equation.

H. The losses are more in

- a) Laminar flow
- b) Transition flow
- c) Turbulent flow
- d) Critical flow

I. A pressure of 25m of head of water is equal to

- a) 25kN/m^2
- b) 245kN/m^2
- c) 2500kN/m^2
- d) 215kN/m^2

J. In series pipe problems

- a) The head loss is same through each pipe
- b) The discharge is same through each pipe
- c) The discharge is added through each pipe
- d) None of the above

SECTION -B (ESSAY TYPE QUESTIONS)
(5x5=25 Marks)

1. A flat plate 0.1m^2 area is pulled at 30m/s relative to another plate located at a distance of 0.01 cm from it, the fluid separating them being water with $\mu = 0.001\text{Ns/m}^2$. Find the force and power required to maintain the velocity.
2. What is hydrostatic law? What do you mean by hydrostatic paradox?
3. A cylindrical buoy is 2m in diameter; 2.5 m long and weighs 2.2 metric tons. The density of water is 1025kg/m^3 . Show that the body cannot float with its axis vertical.
4. What do you mean by vorticity? Write relation between vorticity and circulation.
5. Air flows steadily through a horizontal nozzle. At the nozzle inlet, the velocity is 6m/s and the pressure is 100kN/m^2 . If the inlet area is 0.1m^2 and the contraction ratio is 5 , Determine the velocity and pressure at the exit.
6. Explain Prandtl's mixing line theorem.
7. Write short notes on
 - a) Reynold's number
 - b) Dimensional homogeneity
 - c) Turbulent flow
8. Derive Darcy - Weisbach equation for head loss due to friction in pipes.

==END OF PAPER==