

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:2130602****Date:01-08-2023****Subject Name:Fluid Mechanics****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define (1) Vapour Pressure (2) Mass Density (3) Kinematic Viscosity	03
	(b) What is Fluid? Explain types of Fluids.	04
	(c) State Pascal's law and prove it with suitable assumptions.	07
Q.2	(a) Describe single column manometer with neat sketch.	03
	(b) Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure.	04
	(c) Oil having specific gravity 0.95 is flowing through a pipe of 20 cm diameter. If rate of flow is 50 lit/s and viscosity of oil is 1 poise, decide the type of flow.	07
	OR	
	(c) Liquid is flowing through 200 mm diameter tube with mean velocity of 2 m/sec. If density of liquid is 912 kg/m ³ and viscosity if 0.38 N-S/m ² . Find type of flow.	07
Q.3	(a) Define Stable equilibrium, Unstable equilibrium and Neutral equilibrium for submerged body.	03
	(b) Describe with sketch the construction, operation and use of pitot tube.	04
	(c) State the Bernoulli's equation for steady flow of an incompressible fluid. Derive an expression for Bernoulli's theorem stating the assumptions made in such derivation.	07
	OR	
Q.3	(a) Explain Archimedes principal.	03
	(b) What is Venturimeter? Derive an expression for the discharge through a venturimeter.	04
	(c) Derive the Euler's equation of motion.	07
Q.4	(a) Classify orifice based on shape, size and nature of discharge	03
	(b) Differentiate Large and small orifice and External mouth piece and internal mouth piece	04
	(c) An orifice meter with outer diameter of 150 mm is used to measure the rate of flow of oil in a pipe of 300 mm diameter. The manometer shows a pressure difference of 40 cm of mercury. Find the rate of flow of oil through pipe, if specific gravity of oil is 0.8. Take $C_d = 0.6$, specific gravity of mercury = 13.6	07

OR

- Q.4** (a) Distinguished between notch and weir. **03**
 (b) Distinguished between Mouth piece running free and full and Wholly submerged and partially submerged orifice **04**
 (c) A venturimeter having inlet and throat diameter of 200 mm and 100 mm respectively is fitted in a pipe conveying water. The pressure intensity at inlet is 130 kN/m^2 and vacuum pressure head of 35 cm of mercury at throat. Assuming 4% of the differential head lost between the inlet and throat section, find the rate of flow. Take specific gravity of mercury = 13.6 **07**
- Q.5** (a) Differentiate Drag and Lift. **03**
 (b) Explain Magnus effect. **04**
 (c) Calculate the Mach number at a point on a jet propelled aircraft which is flying at 1200 km/hour at sea level where air temperature is 20°C . Take $k = 1.4$ and $R = 287 \text{ J/kg}^\circ\text{K}$. **07**
- OR**
- Q.5** (a) What is Drag? Write types of drag. **03**
 (b) Explain Karman vortex street. **04**
 (c) An aeroplane is flying at a height of 10 km where temperature is -35°C . The speed of plane is corresponding to $M = 2$. Find the speed of the plane. Assume $k = 1.4$ and $R = 287 \text{ J/kg}^\circ\text{K}$. **07**
