

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3130502****Date:24-07-2023****Subject Name:Fluid Flow Operations****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 Viscosity.	03
	(b) Write different units of pressure and give their interconversion.	04
	(c) Derive the working equation of a U tube manometer.9	07
Q.2	(a) Define: (i) Ideal fluid (ii) Potential flow (iii) Fully developed flow.	03
	(b) The maximum depth of the Arabian sea is roughly 4600 m. What is the pressure at this point if the average density of the sea water is taken as 1040 kg/m ³ .	04
	(c) Derive the Hagen-Poiseuille's equation.	07
OR		
	(c) Derive the equation of continuity.	07
Q.3	(a) What is the significance of hydraulic radius?	03
	(b) Discuss about different time independent non-Newtonian fluids. Give atleast one example of each.	04
	(c) Derive Bernoulli's equation and explain the correction factors involved in it.	07
OR		
Q.3	(a) What is the relation between point velocity, average velocity and maximum velocity for laminar flow of a Newtonian fluid in a pipe?	03
	(b) Explain the significance of kinematic viscosity.	04
	(c) Water is flowing through a pipe having diameters 30 cm and 20 cm at the bottom and upper level respectively. The intensity of pressure at the bottom end is 2.5 kgf/cm ² and the pressure at the upper end is 1 kgf/cm ² . Determine the difference in datum head if the rate of flow through pipe is 40 lit/sec.	07
Q.4	(a) Explain the significance of Mach number.	03
	(b) Explain the Rayleigh method for dimensional analysis.	04
	(c) Explain construction and working of a centrifugal pump.	07
OR		
Q.4	(a) Discuss Drag force and Drag coefficient.	03
	(b) Discuss flow of compressible fluid through convergent-divergent nozzles.	04
	(c) Explain construction and working of a reciprocating pump.	07

- Q.5** (a) What is cavitation in pumps? How is it resolved. **03**
(b) Explain construction and working of a globe valve **04**
(c) Derive the working equation for a venturi meter. Also explain its construction and working **07**

OR

- Q.5** (a) Why the coefficient of discharge of venturi meter is larger than that of an orifice meter? **03**
(b) Explain construction and working of a gate valve. **04**
(c) Derive the flow equation for a sudden expansion in a pipe. **07**
