Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2153507 **Date: 20/06/2019**

Subject Name: Elements of Fluid Flow

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.**

Q.1	**(a)**	Define Froude number and explain different flows based on this number.	**03**
	(b)	Derive an expression for pressure-density-height relationship.	**04**
	(c)	Explain in detail the nature of turbulence.	**07**
Q.2	**(a)**	Write the range of Reynolds number for laminar, transition and turbulent flow.	**03**
	(b)	Write a note on boundary layer.	**04**
	(c)	Explain Rayleigh method with an example for dimensional analysis.	**07**
		OR	
	(c)	Explain Buckingham Pi theorem with an example for dimensional analysis.	**07**
Q.3	**(a)**	What is dimensional analysis?	**03**
	(b)	Determine Reynolds number and type of flow for polymer melt with a density of 900 kg/m^3 and viscosity of 1Pa-s flowing at 0.2 m/s in a 20 mm tube	**04**
	(c)	Derive Reynold's Analogy.	**07**
		OR	
Q.3	**(a)**	What are weirs? State the different types of weirs.	**03**
	(b)	What are sonic, subsonic and supersonic flows? At which dimensionless number they are dependent explain in detail.	**04**
	(c)	Explain Newtonian and Non-Newtonian fluids with their corresponding stress strain curves and examples.	**07**
Q.4	**(a)**	Find the kinematic viscosity of an oil having density 981 kg/m^3. The shear stress at a point in oil is 0.2452 N/m^2 and velocity gradient at that point is 0.2 per second.	**03**
	(b)	What are pressure transducers?	**04**
	(c)	Explain at least five different types of flows.	**07**
		OR	
Q.4	**(a)**	What is Newton's law of viscosity?	**03**
	(b)	Explain similarity laws in brief.	**04**
	(c)	Derive equation of motion.	**07**
Q.5	**(a)**	Classify various flow meters.	**03**
	(b)	Write difference between venturi meter and orifice meter.	**04**
	(c)	A "U"-tube manometer containing mercury of density 13600 kg/m^3 is used to measure the pressure drop along a horizontal pipe. If the fluid in the pipe has a specific gravity of 0.8 and the manometer reading is 0.6m, what is the pressure difference measured by the manometer?	**07**
		OR	
Q.5	**(a)**	What is Rheology?	**03**
	(b)	Explain in detail about Magnus effect	**04**
	(c)	Explain principle and working of Rotameter with diagram.	**07**

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