

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018****Subject Code: 2153507****Date: 11/12/2018****Subject Name: Elements of Fluid Flow****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Define Mach 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) Define: Absolute pressure, gauge pressure and vacuum pressure.	03
	(b) Explain laminar and turbulent flow with Reynolds number and examples.	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 1 Pa-s flowing at 0.2 m/s in a 20 mm tube	04
	(c) Explain in detail the boundary layer theory.	07
	OR	
Q.3	(a) Write a classification of notches and weirs.	03
	(b) What are manometers? Explain U-tube manometer briefly.	04
	(c) What are sonic, subsonic and supersonic flows? At which dimensionless number they are dependent explain in detail.	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 the following terms i) Steady and Unsteady flow (ii) Uniform and non-uniform flow (iii) Laminar and turbulent flow (iv) Compressible and Incompressible flow	07
	OR	
Q.4	(a) Derive equation of continuity for one dimension.	03
	(b) What are similarity laws? Explain.	04
	(c) Explain Newtonian and Non-Newtonian fluids with their corresponding stress strain curves and examples?	07
Q.5	(a) Classify various flow meters.	03
	(b) Explain in detail about Magnus effect.	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 0.6 m , what is the pressure difference measured by the manometer?	07

OR

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| Q.5 | (a) | State application of Hot wire anemometer. | 03 |
| | (b) | Explain working of rotameter with neat diagram. | 04 |
| | (c) | Derive Equation of motion. | 07 |

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