Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER IV (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2741601 **Date:04/05/2016**

Subject Name: ADVANCED TRANSPORT PHENOMENA

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.**

Q.1	**(a)**	Derive the equation of motion for three dimensional flow.	**07**
	(b)	Discuss about friction factor for flow in tube for laminar and turbulent flow.	**07**
Q.2	**(a)**	Derive the equation of continuity for a fluid flowing across the stationary cube.	**07**
	(b)	Quantitative comparison of laminar and turbulent velocity distributions.	**07**
		OR	
	(b)	Discuss friction factor for flow in conduits and flow around submerged objects.	**07**
Q.3	**(a)**	What pressure gradient is required to cause N-N-diethylaniline to flow in a horizontal smooth circular tube of inside diameter D= 3 cm at a volumetric rate of Q= 1.6 liter/sec at 20 ^{0}C? At this temperature the density of diethyl aniline is 0.935 gm/cm^3 and its viscosity is 1.95 cP. Data: $f = 0.0791/Re^{0.25}$	**07**
	(b)	Write in brief about heat transfer coefficient for forced convection through packed beds.	**07**
		OR	
Q.3	**(a)**	Obtain concentration profile equation for diffusion with heterogeneous chemical reaction.	**07**
	(b)	Discuss in detail about Reynolds anology and Prandtl mixing length.	**07**
Q.4	**(a)**	Explain basic laws of scalar and vector algebra. Briefly discuss tensor operations.	**07**
	(b)	Determine the temperature distribution in an incompressible liquid confined between two coaxial cylinders, the outer one of which is rotating at a steady angular velocity.	**07**
		OR	
Q.4	**(a)**	Discuss concentration distribution equation with homogeneous chemical reaction.	**07**
	(b)	Discuss the concentration profile in tubular reactor.	**07**
Q.5	**(a)**	Discuss about mass transfer coefficient in falling film on plane surface.	**07**
	(b)	Discuss advantages, limitations, application for Computational fluid dynamics.	**07**
		OR	
Q.5	**(a)**	Discuss about heat transfer coefficient for condensation of pure vapors on solid surface.	**07**
	(b)	Discuss about mass transfer in falling film over plane surface.	**07**

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