Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2141406 **Date:21/11/2016**

Subject Name:Food Engineering Transport Phenomenon

Time:02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

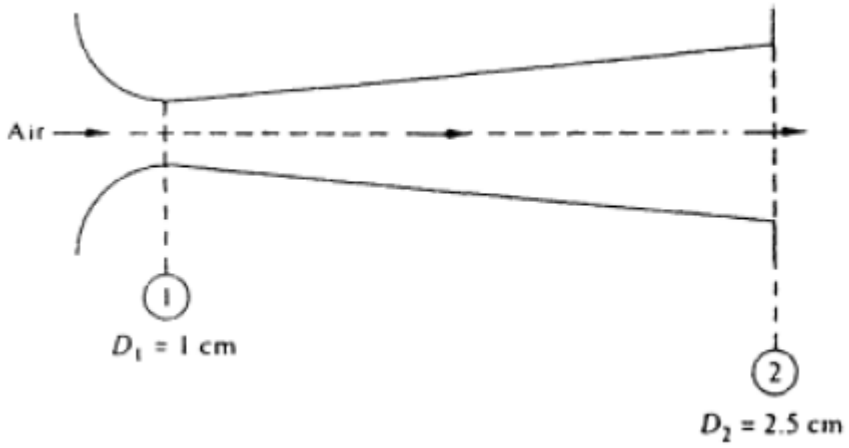
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1		**Short Questions**	**14**
	1	Define Weir.	
	2	What is the value of density for water at room temperature?	
	3	Which of the following is not used as a manometric fluid? a. Mercury b. $KMnO_4$ c. Toluene d. None of the above	
	4	What is laminar flow?	
	5	Raynold number is dimension less number. True or False	
	6	Write dimensions of Pressure.	
	7	What is dynamic viscosity?	
	8	Draw velocity distribution in a pipe.	
	9	Define diffusivity.	
	10	Raynold number range for turbulent flow is……	
	11	What is significance of Froude number?	
	12	Statement of continuity equation is……..	
	13	Write dimensions of specific weight.	
	14	Define center of buoyancy.	
Q.2	**(a)**	Draw conditions of equilibrium of baloon filled with air.	**03**
	(b)	Explain concept of Diffusivity and Fick's law of diffusion.	**04**
	(c)	State law of conservation of mass and also derive an expression of continuity for Cartesian co-ordinates.	**07**
		OR	
	(c)	State and Derive Pascal's expression.	**07**
Q.3	**(a)**	Draw and explain in detail about Venturi meter.	**07**
	(b)	Classify various flow meters and explain Nozzles in detail.	**07**
		OR	
Q.3	**(a)**	Derive Bernoulli's equation and also state assumptions made while deriving it.	**07**
	(b)	Write a short note on Buckingham's pi-theorem for dimensional analysis.	**07**
Q.4	**(a)**	List out types of weirs .Explain V-notch with labeled diagram	**03**

	(b)	What is the importance of unit and dimension of any physical quantity.	**04**
	(c)	Explain Boundary layer and boundary layer thickness in detail.	**07**

OR

Q.4	**(a)**	Draw velocity and shear stress distribution of viscous fluid flowing through tubular pipe.	**03**
	(b)	The converging diverging nozzle expands and accelerates air to supersonic speed at exit where p2= 8 kPa and T2=240 K. At throat p1=284 kPa, T1=665 K and v1= 517 m/s. For steady compressible flow of an ideal gas estimate (a) the mass flow rate (b) velocity v2	**04**



	(c)	Define pressure. Enumerate pressure measuring devices and derive an expression of pressure for Single column manometer.	**07**
Q.5	**(a)**	Explain surface tension in detail.	**03**
	(b)	Explain Newton's law of viscosity with units of each quantity used in it.	**04**
	(c)	Find out the one dimensional relationship between maximum velocity and average velocity of incompressible fluid in a circular pipe.	**07**

OR

Q.5	**(a)**	An open tank contains water up to depth of 2m and above it an oil of specific gravity 0.9 for depth of 1m. Find the pressure intensity (1) At the interface of two liquids and (2) At the bottom of the tank.	**03**
	(b)	Write a short note on Rotameter.	**04**
	(c)	Write in detail about velocity potential function and stream function.	**07**

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