

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-III Examination May 2012****Subject code: 131403****Subject Name: Food Engineering Transport Phenomenon****Date: 09/05/2012****Time: 02.30 pm – 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)	Answer the followings	
	1.	Derive the hydrostatic law for determination of pressure in a fluid at rest.	4
	2.	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.	3
	(b)		
	1.	Give the classification of devices used for pressure measurement. Derive an equation of pressure for vertical single column manometer.	5
	2.	A simple U-tube manometer containing mercury, it is connected to the pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe if the difference of mercury level in the two limbs is 40 cm and the height of the fluid in the left limb from the center of pipe is 15 cm below.	2
Q.2	(a)		
	1.	Write a short note on : meta centre	3
	2.	Derive the continuity equation for three dimensions.	4
	(b)	Define the following terms	7
	1.	Meta centric height of the object	
	2.	Turbulent flow	
	3.	Compressible flow	
	4.	Reynolds's number	
	5.	Rate of discharge	
	6.	Give the range of Reynolds's number for transition flow	
	7.	Centre of buoyancy	
		OR	
	(b)		
	1.	Velocity potential function is given by an expression $\phi = - (xy^3/3) - x^2 + (x^3y/3) + y^2$ (i) Find the velocity components in x and y directions (ii) Show that ϕ represents a possible case of flow	4
	2.	Write in brief about: Velocity potential functions.	3
Q.3	(a)		
	1.	Write a short note on: Newton's law of viscosity	4
	2.	The distance between two plates is 0.5 cm , velocity is 10 cm/sec. the fluid is	

	(b)	Derive an equation of velocity distribution for flow of viscous fluid through circular pipe.	7
		OR	
Q.5	(a)	Write a short note on boundary layer concept.	7
	(b)	What is diffusion? Explain Fick's law of diffusion in detail.	7
