## **GUJARAT TECHNOLOGICAL UNIVERSITY** PDDC - SEMESTER-III • EXAMINATION – SUMMER 2013

I DDC - SEMIESTER-III · EXAMINATION - SUMMER 2015							
Subject Code: X 31901Date: 09-05Subject Name: Fluid Mechanics							
	Time: 02.30 pm - 05.00 pm Total Mark						
Instru							
		Attempt all questions.					
	2. Make suitable assumptions wherever necessary.						
	3.	Figures to the right indicate full marks.					
Q.1	<b>(a)</b>	State Pascal's law and prove it.	07				
<b>C</b>	(b)		07				
Q.2	<b>(a)</b>	•	07				
		(i) Manometer (ii) Specific Gravity					
		(iii) Specific Volume (iv) Density					
		(v) Metacentre (vi) Buoyancy					
		(vii) Viscosity	07				
	<b>(b)</b>	Classify Manometers. Explain U – tube manometer with neat sketch. $\mathbf{OR}$					
	<b>(b)</b>						
		for dimensional analysis.					
Q.3	(a)	Derive Continuity Equation in 3 – dimension rectangular co-ordinate					
		system.					
	(b)	A 30 cm diameter pipe, conveying water, branches into two pipes of <b>0</b> 7					
		diameters 20 cm and 15 cm respectively. If the average velocity in					
		30  cm diameter pipe is 2.5 m/s, determine discharge in this pipe. Also					
		find velocity in 15 cm diameter pipe if the average velocity in 20 cm diameter pipe is 2 m/s.					
		OR					
Q.3	<b>(a)</b>		07				
X.C	()	rectangular plate with 2 m wide and 3 m deep which is placed					
		vertically in water in such a way that upper edge is horizontal and					
		2.5 m below the water surface.					
	<b>(b)</b>	Discuss the conditions of equilibrium of floating and submerged 07					
		bodies					
Q.4	<b>(a)</b>	Velocity components of a fluid flow are given as	07				
		u = (6xy2 + t), v = (3yz + t2 + 5), w = (z + 3 ty), where x, y, z are					
		given in meters and time t in seconds. Determine velocity vector at $P(4, 1, 2)$					
		point P $(4, 1, 2)$ at time t = 4 seconds. Also determine the magnitude of					
		velocity and acceleration of the flow for given location and time.					
	(b)	The right limb of a simple U – tube manometer containing mercury is	07				
	(0)	open to the atmosphere while the left limb is connected to a pipe in	07				
		which a fluid of specific gravity 0.9 is flowing. The centre of pipe is					
		<i>12</i> cm below the level of mercury in the right limb. Find the pressure					
		of fluid in the pipe if the difference of mercury level in two limbs is					
		20 cm.					

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Q.4	<b>(a)</b>	Derive expression for discharge through horizontal venturimeter.	07
	<b>(b</b> )	State and prove Bernoulli's equation.	07
Q.5	(a)	Distinguish between (i) Steady and unsteady flow	
		(ii) Uniform and non uniform flow	
		(iii) Compressible and incompressible flow	
	<b>(b)</b>	The efficiency of fan $\eta$ depends upon diameter of rotor D, discharge	07
		of fluid Q, density of fluid $\rho$ , dynamic viscosity of fluid $\mu$ and angular	
		velocity of rotor $\omega$ . Find expression for $\eta$ in terms of dimensionless	
		parameters.	
		OR	
<b>Q.5</b>	<b>(a)</b>	Derive an expression for the velocity distribution for viscous flow	07
-		through a circular pipe.	
	$(\mathbf{L})$	Device the Hanner Devices like exception. State the commution much	07

(b) Derive the Hagen-Poiseullie equation. State the assumption made. 07

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