PRN:		Course Code:	U11PC303

Second Year **B. Tech** End Semester Examination Winter 2024

Fluid Mechanics

000086

Day and Date: Wed 27/11/2024 Max Marks: **50**

Time: 10:30AM To 12:30PM Duration: **02** hrs

Instructions:

1. All questions are compulsory.
2. Assume suitable data wherever necessary and mention it clearly.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following Question.**			
	a)	For a low of viscous fluid through a circular pipe under laminar flow condition show that the velocity distribution is a parabola.	10	1	1
Q.2		**Attempt the following Question.**			
	a)	Derive the Bernoulli's equation and state the assumptions made while deriving the equation.	10	2	1
		OR			
	b)	An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drops in 100 m length of the pipe is 1800 kN/m^2, Determine: i.) The rate of flow of oil; ii.) The centre-line velocity; iii.) The total frictional drag over 100 m length; iv.) The power required to maintain the flow; v.) The velocity gradient at the pipe wall; vi.) The velocity and shearstress at 8 mm from the wall.	10	3	2
Q.3		**Attempt the following Question.**			
	a)	The force exerted by a flowing fluid on a stationary solid body depends upon the length (L) of the body, velocity (V) of fluid, the density (ρ) of fluid, viscosity (μ) of fluid and acceleration due to gravity (g). Find an expression for the force using dimensional analysis.	10	1	3
		OR			
	b)	The efficiency η of a fan depends on density ρ, dynamic viscosity μ of the fluid, angular velocity ω, diameter D of the rotor and the discharge Q. Express η in terms of dimensionless parameters.	10	2	3
Q.4		**Attempt the following Question.**			
	a)	Discuss about construction and working details of Francis turbine with a neat sketch.	10	1	4
		OR			
	b)	Enumerate the differences between an impulse turbine and reaction turbine.	10	3	4
Q.5		**Attempt the following Question.**			
	a)	Explain the working of the following pumps with the help of neat sketches and mention two applications of each. i.) External gear pumps ii.) Lobe pumps iii.) Vane pump and iv.) Screw pump.	10	3	5
		OR			
	b)	Explain the working principle with the main parts of centrifugal pump.	10	3	5

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