Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (R) (FT/WP) Examination November 2025 (2024 Scheme).

Course Code: PCMET303

Course Name: FLUID MECHANICS AND MACHINERY

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

	(Answer all questions. Each question carries 3 marks)	CO	Marks
1	The specific gravity of a liquid is 3.What are its specific weight, specific mass and specific volume.	CO1	(3)
2	Explain the states of equilibrium of a floating body.	CO1	(3)
3	Differentiate between the Eulerian and Lagrangian methods of representing fluid flow.	CO2	(3)
4	What are the three major assumptions used in the derivation of the Bemoulli's equation?	CO2	(3)
5	What is the significance of Reynold's number?	CO3	(3)
6	Differentiate between laminar and turbulent boundary layers.	CO4	(3)
7	Define the following terms with respect to turbines (i)Hydraulic Efficiency (ii)Mechanical Efficiency (iii) Overall Efficiency.	CO5	(3)
8	Define slip, percentage slip and negative slip of a reciprocating pump.	CO5	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

9	a)	Differentiate between ideal fluids and real fluids. Mark those on rheological diagram.	CO1	(4)
	b)	The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of Sp.gr.0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of the fluid in the pipe if the difference of mercury level in the two limbs is 20 cm.	CO1	(5)
10	a)	Distinguish between dynamic viscosity and kinematic viscosity.	CO1	(4)
	b)	Determine the total pressure and position of centre of pressure on an isosceles triangular plate of base 5m and altitude 5m when the plate is immersed vertically in an oil of specific gravity 0.8. The base of the plate is 1m below the free surface of oil.	CO1	(5)

Module -2

11	a)	The stream function for a two dimensional flow is given by $\Psi=2xy$,calculate the velocity at the point P(2,3).Find the velocity potential function ϕ	CO2	(5)
	b)	Define the following with example. i) Stream lines ii) Stream tube iii) Path lines iv) Streak lines	CO2	(4)
12	a)	Derive an expression for the continuity equation in Cartesian coordinates	CO2	(5)
	b)	Differentiate between i) steady and unsteady ii) uniform and non-uniform flows.	CO2	(4)

Module -3

13	a)	Derive Darcy -Weisbach equation for head loss due to friction.	CO3	(5)
	b)	What is a boundary layer? What causes a boundary layer to develop?	CO4	(4)

14	a)	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 discharge Q. Express η in terms of dimensionless parameters.	CO4	(5)
	b)	Write short notes on different types of losses in a pipe flow.	CO3	(4)

Module -4

15	a)	Describe briefly the function of various main components of Pelton Turbine.	CO5	(5)
	b)	Obtain an expression for the force exerted by a jet of water on a fixed inclined plate in the direction of the jet.	CO5	(4)
16	a)	A jet of water of diameter 7.5cm strikes a curved plate at its centre with a velocity of 20m/s.The curved plate is moving with a velocity of 8m/s in the direction of the jet. The jet is deflected through an angle of 165° ·Assuming the plate smooth find :(1) Force exerted on the plate in the direction of jet (2)Power of the jet and(3)Efficiency of the jet.	CO5	(5)
	b)	A single acting reciprocating pump running at 60 rpm delivers 0.53 m^3 of water per minute. The diameter of the piston is 200 mm and stroke length is 300 mm. The suction and delivery heads are 4 m and 12 m respectively. Determine the theoretical discharge, coefficient of discharge, percentage slip and power required to run the pump.	CO5	(4)

***