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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S) Examinations (FT/WP) May 2026 (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	Distinguish between absolute pressure, gauge pressure and vacuum pressure.	CO1	(3)
2	Define buoyancy and centre of buoyancy.	CO1	(3)
3	Explain the velocity potential function.	CO2	(3)
4	Differentiate between the pitot tube and the pitot-static tube.	CO2	(3)
5	Explain the terms hydraulic gradient line and energy gradient line.	CO3	(3)
6	What is the significance of Moody's chart?	CO3	(3)
7	Differentiate between turbines and pumps.	CO5	(3)
8	Define the term negative slip in a reciprocating pump.	CO5	(3)

PART B

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

Module -1

9	a)	Define total pressure and centre of pressure.	CO1	(4)

	b)	A triangular plate with a base width of 1.5m and a height of 2m lies immersed in water with its apex downwards. The base of the plate is 1m below and parallel to the free surface. Calculate the total pressure on the plate and the depth of the centre of pressure.	CO1	(5)
10	a)	What is the capillary effect? What is its cause? How is it affected by the contact angle?	CO1	(3)
	b)	A differential manometer is connected to two pipes whose centres are 2.5m apart. The higher-level pipe is carrying a liquid of specific gravity 1.594 under a pressure of 1.05 bar, and the other pipe is carrying a liquid of specific gravity 0.8 under a pressure of 1.71 bar. The manometric fluid is mercury. The mercury level in the left limb is 4 m below the centre of the pipe carrying low-pressure liquid. Find the difference in the mercury level in the manometer.	CO1	(6)

Module -2

11	a)	If for a 2-D flow, the velocity potential is given by $\emptyset = x\,(2y-1)$, determine the velocity at the point P (4, 5). Also, determine the value of the stream function at the point P	CO2	(6)
	b)	State the assumptions of Euler's equation	CO2	(3)
12	a)	Prove that streamlines and equipotential lines are orthogonal.	CO2	(6)
	b)	Explain the term stream function.	CO2	(3)

Module -3

13	a)	Derive the expression for the Hagen–Poiseuille equation for flow through a pipe.	CO3	(6)
	b)	Define major and minor losses in pipes with examples.	CO3	(3)

14	a)	Draw a neat diagram and explain the concept of boundary layer development along a long thin plate. Describe the details of various regions in the boundary layer.	CO4	(4)
	b)	State Buckingham's π theorem. How are the repeating variables selected in dimensional analysis?	CO4	(5)

Module -4

15	a)	A jet of water 10 cm in diameter with a velocity of 40m/s strikes a flat vertical plate. Find the force exerted on the plate and the work done when: (i) The plate is stationary (ii) The plate is moving with a velocity of 10m/s along the jet direction.	CO5	(9)
16	a)	What is a reciprocating pump? Describe the working of a reciprocating pump with a neat sketch.	CO5	(5)
	b)	Compare between the reciprocating pump and centrifugal pump.	CO5	(4)

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