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Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

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

**Course Code: PCCET302****Course Name: FLUID MECHANICS**

Max. Marks: 60

Duration: 2 hours 30 minutes

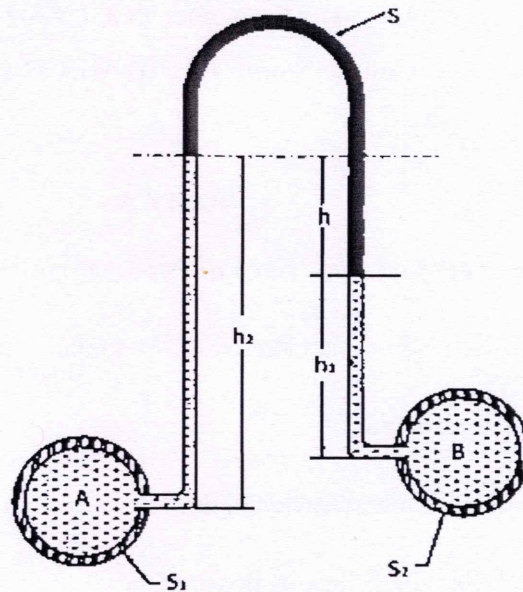
PART A*(Answer all questions. Each question carries 3 marks)*

		CO	Marks
1	Differentiate between Newtonian and Non Newtonian fluids.	CO1	(3)
2	State and prove Pascal's law.	CO2	(3)
3	Explain metacentre and metacentric height.	CO3	(3)
4	Explain three stability conditions of floating body.	CO3	(3)
5	Differentiate between velocity potential function and stream function.	CO2	(3)
6	State the difference between i. Steady and unsteady flow ii. Uniform and non-uniform flow	CO2	(3)
7	Define the three hydraulic coefficients of an orifice.	CO2	(3)
8	Define hydraulic gradient line and total energy line.	CO5	(3)

PART B*(Answer any one full question from each module, each question carries 9 marks)***Module -1**

9	a) What is a piezometer? Explain its working principle.	CO2	(3)
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- b) Determine the pressure difference between A and B, if $S_1=1.2$, $S=0.8$ and CO_2 (6)
 $S_2=2.4$. Consider the height of liquid column as $h=20\text{cm}$, $h_1=30\text{cm}$ and $h_2=65\text{cm}$.



- 10 a) A simple U tube manometer is used to measure the vacuum pressure of a CO_2 (6)
 liquid of specific gravity 0.85 flowing through a pipe. One end of the
 manometer is connected to the centre of the pipe and other end is open to
 atmosphere. The difference in mercury level in the two limbs is 30 cm and
 height of the liquid in the limb connected to pipe is 20 cm from the centre of
 the pipe. Determine the pressure in the pipe.
- b) Differentiate between Dynamic viscosity and Kinematic viscosity. CO_1 (3)

Module -2

- 11 a) How the metacentric height of a floating body can be determined CO_3 (4)
 experimentally?
- b) A block of wood of specific gravity 0.7 is supposed to be floating in water. CO_3 (5)
 Determine the metacentric height of the block if its size is 2 m x 1 m x 0.8 m.
- 12 a) Derive an expression for the force exerted on a submerged vertical plane CO_2 (5)
 surface by the static fluid and locate the position of centre of pressure.

- b) Find the total pressure and centre of pressure on a rectangular plate of size 2m x 3m vertically immersed in water, when depth of its base is 5m below the surface. CO2 (4)

Module -3

- 13 a) An orifice meter consisting of 80 mm diameter orifice in a 200 mm diameter pipe has $C_d=0.65$. The pipe delivers oil of specific gravity 0.8. The pressure difference in the two sides of the orifice plate is measured by mercury-oil differential manometer. If the differential gauge reading is 700 mm of mercury, determine the rate of flow of oil through the pipe in litres/s. CO2 (7)
- b) State the impulse momentum principle. CO4 (2)
- 14 Derive the continuity equation in 3D Cartesian coordinates. Also check whether the flow is continuous or not when $u=2x+3y$, $v=2yz+xy$ and $w=4x+xyz$. CO2 (9)

Module -4

- 15 a) A circular tank is having diameter 2m with water up to a height of 3m. If the orifice at the bottom of the tank is having a diameter of 15cm, calculate the time required to empty the tank. Take $C_d = 0.62$ CO2 (4)
- b) A horizontal pipe carrying water suddenly increases its diameter from 10 cm to 20 cm. Find out the loss of head due to sudden increase in diameter, if the discharge through the pipe is 150 litres/s. CO5 (5)
- 16 a) A 40 metres long weir is divided into 12 equal bays by vertical posts, each 0.6 m wide. Taking $C_d = 0.623$, calculate the discharge over the weir if the head over the crest is 1.20 m and velocity of approach is 2 m/s. CO2 (6)
- b) Differentiate between rapidly varied flow and gradually varied flow. CO5 (3)