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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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24CV44

Fourth Semester B.E. Degree Examination, May 2026
FLUID MECHANICS AND HYDRAULICS

TIME:3 hrs. Max.Marks:100

Note: 1. Answer **any FIVE** full questions, choosing **ONE** question from **each MODULE.**
2. M: Marks, L: Bloom's level,C: Course outcomes.
3. Assume missing data suitably.

		Module-1	M	L	C
Q.1	a	Distinguish between (i) Ideal and real fluids (ii) Newtonian and non-Newtonian fluids (iii) dynamic viscosity iv) kinematic viscosity.	6	L1	CO1
	b	State Newton's law of viscosity. Derive an expression for the same.	6	L2	CO1
	c	The space between two square flat parallel plates is filled with oil. Each side of the plate is 720 mm. The thickness of the oil film is 15 mm. The upper plate, which moves at 3m/s requires a force of 120N to maintain the speed. Determine The dynamic viscosity of the oil The kinematic viscosity of oil if the specific gravity ofoilis0.95.	8	L3	CO1
		OR			
Q.2	a	Calculate the specific weight, density and specific gravity of one litre of a liquid weighs 7 N.	6	L1	CO1
	b	Explain with neat sketch of different types of pressure gauges.	6	L2	CO1
	c	A U - tube manometer is used to measure the pressure of oil os specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right limb is open to the atmosphere. The centre of the pipe is 100 mm below the level of mercury(specific gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 160 mm. Determine the absolute pressure of the oil in the pipe.	8	L3	CO1
		Module–2			
Q.3	a	Derive continuity equation for a three- dimensional flow in Cartesian coordinates.	6	L2	CO2
	b	Derive Euler's equation of motion and obtain Bernoulli's equation from it.	8	L2	CO2
	c	A horizontal venturi meter with inlet and throat diameters 30cm and 15cm respectively is used to measure the flow of water. The readings of differential manometer connected to inlet and throat is 20cm of mercury. Determine the rate of flow. Take Cd=0.98.	6	L2	CO2
		OR			
Q.4	a	Differentiate between: (i) Uniform and non-uniform flow, (ii) Steady and unsteady flow (iii) laminar and turbulent flow.	6	L2	CO2
	b	The water is flowing through a tapering pipe having diameters 200 mm and 100 mm at a section 1 and 2 respectively. The discharge through the pipe is 35 litres/sec. The section 1 is 6 m above datum and section 2 is 4 m above datum. Find the intensity of pressure at section 2 if that at section 1 is 39.24 N/cm^2	8	L3	CO2

	c	A pitot tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6m and static pressure head is 5m. Calculate the velocity of flow assuming coefficient of the tube 0.98.	6	L2	CO2
		Module–3			
Q.5	a	Define hydraulic coefficients for an orifice and give the relation between them.	6	L2	CO3
	b	Water discharge at the rate of 98.2 litre/sec through a 120mm diameter vertical sharp-edged orifice placed under a constant head of 10m.A point on the jet measured from vena contrata of the jet has the coordinate (4.5,0.54). Find the hydraulic coefficients of the orifice.	8	L3	CO3
	c	Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 litres/sec.	6	L2	CO3
		OR			
Q.6	a	Obtain an expression for discharge over a triangular notch in terms of head of water over its crest.	6	L2	CO3
	b	The water flows through a triangular right-angled weir first and then over a rectangular weir of 1 m width. If the coefficients of discharge of the triangular and rectangular weirs are 0.60 and 0.62, respectively and the depth of the triangular weir is 30 cm, then determine the depth of water over the rectangular weir.	8	L3	CO3
	c	Explain the hydraulic gradient line and Total Energy line with a neat sketch.	6	L2	CO3
		Module–4			
Q.7	a	Explain most economical section of channel. Derive the condition for most economical section of a rectangular channel.	10	L2	CO4
	b	An trapezoidal channel having side slope 1 horizontal to 2 vertical and the slope of the bed is1in 1500.The area of the section is $40m^2$.Find the dimensions of the section if it is most economical .Determine the discharge of the most economical section if C=50.	10	L3	CO4
		OR			
Q.8	a	Distinguish between i)Hydraulic mean depth and wetted perimeter. ii)Gradually varied flow & rapidly varied flow. iii)Total Energy and Specific Energy . iv)Super critical and sub critical flow.	12	L2	CO4
	b	The discharge of water through a rectangular channel of width 6m, is 18 m^3/s when depth of flow of water is 2m. Calculate i) Specific energy ii) Critical depth iii) critical velocity iv) minimum specific energy.	8	L2	CO4
		Module–5			
Q.9	a	Explain Classification and efficiencies of turbines.	10	L2	CO5
	b	A 50 mm diameter water jet having a velocity of 20 m/s impinges on a curved vane which is moving in the same direction as that of the jet with a velocity of 5 m/s. The jet leaves the vane at an angle of 150° with the direction of motion of vane. Neglecting friction find the following (i) the force exerted by the jet in the direction of motion of the vane (ii) the power developed by the jet (iii) the efficiency of the vane.	10	L3	CO5

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		OR			
Q.10	**a**	With a neat sketch explain the components of Francis Turbine	**10**	**L2**	**CO5**
	b	Design a Pelton wheel for a head of 80m and speed of 300 rpm.The Pelton wheel develops 103KW shaft power.Take Cv =0.98,speed ratio=0.45 and overall efficiency=0.80	**10**	**L3**	**CO5**

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