

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026***Third Semester**Mechanical Engineering***CE3391 - FLUID MECHANICS AND MACHINERY***Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Define mass density.	L1	1	2
2.	Define surface tension.	L1	1	2
3.	State Bernoulli's theorem as applicable to fluid flow.	L1	2	2
4.	Define boundary layer.	L1	2	2
5.	Define dimensional homogeneity.	L1	3	2
6.	State the Buckingham Π theorem.	L1	3	2
7.	Differentiate impulse turbine and reaction turbine.	L1	4	2
8.	Write the functions of draft tube in turbine outlet.	L1	4	2
9.	What is priming? Why is it necessary?	L1	5	2
10.	Classify the reciprocating pumps.	L1	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a If the velocity profile of a fluid over a plate is parabolic with the vertex 20cm from the plate, where the velocity is 120cm/sec. calculate the velocity gradients and shear stresses at a distance of 0 cm, 10 cm and 20cm from the plate, if the viscosity of the fluid is 8.5 poise Or b Derive the continuity equation in differential form or in three Dimensional forms.	L3	1	16
12.	a Three pipes of 400 mm, 200 mm and 300 mm diameters have lengths of 400 m, 200 m, and 300 m respectively. They are connected in series to make a compound pipe. The ends of this compound pipe are connected with two tanks whose difference of water levels is 16 m. if co-efficient of friction for these pipes is same and equal to 0.005, determine the discharge through the compound pipe neglecting first the minor losses and then including them. Or b Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3 m/s using (i) Darcy formula, (ii) Chezy's formula for which C = 60. Take ν for water = 0.01 stoke.	L3	2	16

13.	a	Using buckinghams Π -theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH} \Phi [D/H, \mu/\rho VH]$, where H is the head causing flow, D is the diameter of the orifice, μ is co efficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.	L3	3	16
		Or			
	b	The ratio of lengths of a sub-marine and its model is 25:1. The speed of sub-marine (prototype) is 15m/s. the model is to be tested in a wind tunnel. Find the speed of air in wind tunnel. Also determine the ratio of the drag (resistance) between the model and its prototype. Assume the value of kinematic viscosities for sea water and air as 0.012stokes and 0.016stokes respectively. The density for sea water and air in given as 1030kg/m ³ and 1.24kg/m ³ respectively.	L3	3	16
14.	a	Explain the construction and working principle of Pelton wheel turbine. Also draw the velocity triangle and mention the various velocity components.	L2	4	16
		Or			
	b	A Kaplan turbine working under a head of 20m develops 11772 kW of shaft power. The outer diameter of the runner is 3.5 m and hub diameter is 1.75m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine (i) Runner vane angles at inlet and outlet at the extreme edge of the runner, and (ii) Speed of the turbine.	L3	4	16
15.	a	A single acting reciprocating pump, running at 60rpm delivers 0.53 m ³ of water per minute. The diameter of the piston is 200 mm and stroke length 300 mm. The suction and delivery heads are 4m and 12m respectively. Determine (i) Theoretical discharge (ii) Co-efficient of discharge. (iii) Percentage slip of the pump, and (iv) Power required running the pump.	L3	5	16
		Or			
	b	Explain the construction and working principle of centrifugal pumps. Also draw the velocity triangle an mention the various velocity components.	L2	5	16