Register No: _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Third Semester

Agricultural Engineering

AI3303 – FLUID MECHANICS AND PUMPS

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q. No	*Questions*	*BTL*	*CO*	*Marks*
1.	Define density (or) mass density.	L1	1	2
2.	Define capillarity rise and capillarity fall.	L1	1	2
3.	Compare laminar flow and turbulent flow.	L2	2	2
4.	List the properties of velocity potential function.	L1	2	2
5.	Define dimensional homogeneity.	L1	3	2
6.	What is the expression for head loss due to friction?	L1	3	2
7.	Define equivalent of pipes.	L1	4	2
8.	How does the roughness of channel affect the Chezy's constant?	L1	4	2
9.	List the types of valves.	L1	5	2
10.	Mention the main parts of the centrifugal pump.	L1	5	2

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

Q. No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0.8 m 0.8 m in an inclined plane with an angle of inclination 30 to the horizontal. The weight of the square plate is 300N and it slides down the inclined plane with a uniform velocity of 0.3 m/s. The thickness of oil film is 1.5mm.	L3	1	16
			Or			
	b		A simple U - tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40cm and the height of fluid in the left form the centre of pipe is 15cm below.	L3	1	16
12.	a		Determine the stream function for a fluid flow of u = 2x, v = (-2y). Also determine the velocity potential function ϕ.	L3	2	16
			Or			
	b	i	Derive the expression for Euler's equation of motion.	L3	2	8
		ii	Derive the expression for Bernoulli's equation.	L3	2	8

13.	a	An oil of specific gravity 0.7 is flowing through a pipe of diameter 300mm at the rate of 500 liters/s. Find the head lost due to friction and power required to maintain the flow for a length of 1000m. Take v = 0.29 stokes	L3	3	16
		Or			
	b	Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $u/U = 2(y/s)- (y/s)^2$.	L3	3	16
14.	a	An open channel has a cross-section in the form of trapezium as shown in Figure below. Assuming that the roughness coefficient n is 0.025, the bed slope is 1 in 1800 and the depth of flow is 1.2 m, find the volume rate of flow Q using (a) Chezy's formula with C determined from the Kutter's formula, and (b) the Manning's formula.	L3	4	16
		Or			
	b	A trapezoidal channel with side slopes of 2 horizontal to 1 vertical has to carry a discharge of 20 m/s. if the bottom width is 4 m. calculate the bottom slope required to maintain a uniform flow at a depth of 1.5 m. Take Manning's n = 0.015.	L3	4	16
15.	a	A Centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm works against a head of 40m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at angle of 40° at outlet. If the outer diameter of the impeller is 500 mm & width at outlet is 50 mm. Determine (i) Vane angle at inlet, (ii) Manometric efficiency, (iii) Workdone by impeller on water per second.	L2	5	16
		Or			
	b	A single acting reciprocating pump, running at 50 rpm delivers 0.01 m^3/s of water. The diameter of the piston is 200mm and stroke length 400mm. Determine: i) theoretical discharge of the pump, ii) Co-efficient of discharge and iii) Slip and the percentage of slip of the pump.	L2	5	16