Q.P. Code: 20CE0109 **R20**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B. Tech II Year I Semester Supplementary Examinations November-2022

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid.	L1	6M
	b	The space b/w two square parallel plates filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate which moves at 2.5m/sec requires a force 98.1 N to maintain the speed. Determine the i) Dynamic viscosity of oil in poise. ii) Kinetic viscosity of the oil in stokes, If the specific gravity of the oil 0.95.	L2	6M

OR

2	a	Derive the expression for total pressure of vertical plane surface.	L2	6M
	b	A rectangular plane surface is 2m wide and 3m deep it lies in vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its appear edge is horizontal and i) Coincides with water surface ii).2.5 m below the free surface.	L3	6M

UNIT-II

3	a	Derive Continuity Equation in 3-Dimensional flow.	L3	6M
	b	The Velocity Potential function (ø) is given by an expression $\emptyset = \frac{-xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$ i. Find the velocity components in x and y direction and ii. Show that ø remains represents the possible case of flow.	L3	6M

OR

4	a	Explain in detail about Velocity Potential Function and write its properties	L1	6M
	b	A 30 cm dia. pipe conveying water branches into two pipes of dia. 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in this pipe. Also determine the velocity in 15 cm pipe. If the average velocity in 20 cm diameter pipe is 2 m/s.	L3	6M

UNIT-III

5	a	Derive the Bernoulli's energy equation with assumptions.	L3	6M
	b	Water flows over a rectangular weir 1m wide and at a depth of 150mm and afterwards passes through a triangular right-angled weir. Taking Cd for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.	L2	6M

OR

6	a	Derive an expression for the discharge over a rectangular notch.	L3	6M
	b	The water is flowing through a pipe having diameter of 20 cm and 10 cm at section & 2 respectively. The rate of flow through pipe is 35 lit/sec. The section 1 is 6m above the datum and section 2 is 4m above the datum. If the pressure at the section 1 is 39.24 N/cm2. Find the intensity of pressure at the section 2.	L3	6M

UNIT-IV

7	a	An oil of specific gravity 0.7 flowing through a pipe of 300mm at the rate of 50lit/s. find the head lost due to friction and power required to maintain the flow for a length of 1000m & Take kinematic viscosity 0.29 stoke.	L3	6M
	b	The difference in water surface levels in two tanks, which are connected by the pipes of the lengths 300m, 170m and 210m and of 300mm,200mm and 400mm respectively. Determine the rate of flow of water if coefficient of friction is 0.005, 0.0052 & 0.0048 respectively. Considering i) Minor losses also ii) Neglecting minor losses.	L3	6M

OR

8	a	Three pipes of lengths 800m, 500m & 400m & of diameter 500mm, 400mm & 300mm respectively are connected in series. These pipes are replaced by a single pipe of length 1700m. Find the diameter of the single pipe.	L3	6M
	b	The rate of flow water through a horizontal pipe of 0. 25m m^3/s. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. the pressure intensity in the smaller pipe is 11.772 N/cm^2. Determine i) Loss of head due to sudden enlargement ii) Pressure intensity in the large pipe iii) power lost due to enlargement.	L3	6M

UNIT-V

9	a	Derive the Hagen poiseuille equation.	L3	6M
	b	Calculate i) pressure gradient along flow ii) average velocity iii) discharge for an oil of viscosity 0.02 Ns/m2 flowing between two stationary parallel plates 1m wide maintained 10mm apart. The velocity between plates is 2m/s.	L2	6M

OR

10	a	Derive the expression for resistance of smooth pipes.	L3	6M
	b	A pipe line carrying water has average height of irregularities projecting from the surface of the boundary of the pipe as 0.15mm. What type of boundary is it? the shear stress developed is 4.9 N/m^2 . The kinematic viscosity of water is 0.01 stokes.	L3	6M

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