Q.P. Code: 16CE106 **R16**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in i) water ii) mercury take surface tension 0.0725 N/m for water and 0.52 N/m for mercury in contact with air. The specific gravity of mercury is 13.6and angle of contact 130º?	**L4**	**6M**
	b	Derive expression for surface tension on liquid droplet and soap bubble.	**L2**	**6M**

OR

2	**a**	Define Manometer. Briefly explain the types of manometers in detail?	**L1**	**6M**
	b	A hydraulic press has a ram of 20 cm diameter and plunger of 3 cm diameter. It is used for lifting a weight of 30 KN. Find the force required at the plunger.	**L4**	**6M**

UNIT-II

3	**a**	Obtain an expression for continuity equation for a three - dimensional flow.	**L2**	**8M**
	b	The velocity potential function is given by Ø = 5(x2 – y2). Calculate the velocity components at the point (4, 5).	**L3**	**4M**

OR

4	**a**	State Bernoulli's theorem for steady flow of an incompressible fluid. Derive the expression for Bernoulli's theorem from first principle and state the assumption made for such a derivation.	**L3**	**6M**
	b	What is flowing through a pipe of 5 cm diameter under a pressure of 29.43N/cm3 (gauge) and with mean velocity of 2.0 m/s. Find the total head or total energy per unit weight of the water at a cross section which is 5 m above the datum line.	**L4**	**6M**

UNIT-III

5	**a**	Derive the expression for head loss in pipes due to sudden enlargement and sudden contraction formula.	**L3**	**6M**
	b	A horizontal pipe of diameter 500mm is suddenly contracted to a diameter of 250mm. The pressure intensity in the larger and smaller pipe is given as 13.734 N/cm2 and 11.772 N/cm2 respectively. Find the head lost due to contraction if CC is 0.63.	**L4**	**6M**

OR

6	**a**	The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m and 210m and diameters of 300mm, 200mm and 400mm respectively is 4m. Determine the rate of flow of water if coefficients of friction are 0.005, 0.0052, 0.0048 respectively, considering i) minor losses ii) neglecting minor losses	**L4**	**8M**
	b	Derive the expression for flow through parallel pipes.	**L3**	**4M**

UNIT-IV

7	**a**	A horizontal venture meter with 30cm diameter inlet and 10cm throat is used for measuring the flow of water through a pipeline. If pressure in pipe is 1.5kpa and the vacuum pressure at the throat is 40cm of mercury, calculate the rate of flow. It may be presumed that 5% of differential head is lost between the pipe main and the throat section. Also make calculations for the discharge co-efficient take specific weight of water = $10kN/m^3$	**L4**	**6M**
	b	What is a Mouth Piece? What are the advantages are providing the Mouth Piece? How the Mouth Piece are classified?	**L1**	**6M**

OR

8	**a**	Explain the principle of venturimeter with neat sketch? Also derive the expression of rate of flow of Fluid through on it.	**L1**	**6M**
	b	Water flows over a rectangular weir 1m wide 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 a triangular weir.	**L4**	**6M**

UNIT-V

9	**a**	Derive Hagen Poiseuille equation.	**L3**	**8M**
	b	Calculate: i) The average velocity and ii) The discharge for an oil of viscosity 0.02 Ns/m2 flowing between two stationary plates 1 m wide maintained 10 mm apart. The velocity midway between the plates is 2 m/s.	**L4**	**4M**

OR

10	**a**	Explain the Reynolds's experiment with neat sketch.	**L1**	**6M**
	b	Define Boundary layer and derive the expression for energy thickness.	**L1**	**6M**

*** END ***