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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations November-2020

INTRODUCTION TO FLUID MECHANICS

(Common to CE & AGE)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

1	**a**	Define Manometer.	**2M**
	b	Distinguish between rotational and irrotational flow	**2M**
	c	What is Euler's equation of motion?	**2M**
	d	Define Reynolds's number.	**2M**
	e	What is Pitot tube.	**2M**

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

UNIT-I

2	**a**	Define specific density and specific weight, viscosity, vapor pressure and cavitation.	**5M**
	b	What is the gauge pressure at a point 3m below the free surface of a liquid having a density 1.53 x 10^3 kg/m^3.If the atmospheric pressure is equivalent to 750mm of mercury? The Specific gravity of mercury is 13.6 and density of water = 1000 kg/m^3	**5M**

OR

3	**a**	State Pascal's law. What do you understand the terms Absolute, Gauge, atmospheric & vacuum pressure?	**5M**
	b	An inverted U – tube manometer is connected to two horizontal pipes A and B though which water is flowing. The vertical distance between the axes of these pipes is 30cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes.	**5M**

UNIT-II

4	**a**	Write a brief note on continuity equation for a one- dimensional flow?	**5M**
	b	A stream function is given by $\psi = 5x - 6y$. Calculate the velocity components and also magnitude and direction of the resultant velocity at any point.	**5M**

OR

5	**a**	Write a short notes on the following i) Equipotential line ii) Line of constant stream function iii) Flow net	**5M**
	b	If for a two – dimensional potential flow, the velocity potential is given by $\emptyset = x(2y - 1)$. Determine the velocity at the point p (4, 5). Determine also the value of stream function Ψ at the point p.	**5M**

UNIT-III

6	**a**	What is Euler's equation of motion? How do you obtain Bernoulli's equation from it? Name the different forces present in a fluid flow.	**5M**
	b	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.	**5M**

OR

7	**a**	Find the expression for the Discharge over a Rectangular notch or weir.	**5M**
	b	A sub-marine moves horizontally on a sea and has its axis 15m below the surface of water. A pitot tube properly placed just in front of a sub-marine and along its axis is connected to two limbs of a u – tube containing mercury. The difference of mercury level is found to be 170mm find the speed of the sub-marine knowing that the specific gravity of mercury is 13.6 and that of sea water is 1.026 with respect of fresh water.	**5M**

UNIT-IV

8	**a**	Derive the expression for head loss in pipes due to sudden enlargement and sudden contraction formula.	**5M**
	b	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 minor losses.	**5M**

OR

9	**a**	Find the head lost due to friction in a pipe of diameter 300 mm and the length 50 m, through which water is flowing at velocity of 3 m/s using i) Darcy formula ii) Chezy's formula for which C=60 and kinematic viscosity 0.01 stokes?	**5M**
	b	Derive the expression for flow through pipes in series.	**5M**

UNIT-V

10	**a**	Derive the equation for the flow of viscous fluid between two parallel plates? When plates are fixed.	**5M**
	b	Define Reynolds's number and derive the expression for Reynolds's number.	**5M**

OR

11	**a**	An oil of dynamic viscosity 1.05 poise and relative density 0.92 is flowing through a fixed parallel plates kept 1.2cm a part if the Mean Velocity is 1.40m/s. calculate: i) The maximum velocity ii) boundary shear stress	**5M**
	b	Derive the Expression for maximum velocity for a Laminar flow through circular pipes.	**5M**

*** END ***