Q.P. Code: 18CE0104 **R18**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular Examinations Nov/Dec 2019

INTRODUCTION TO FLUID MECHANICS

(CE & AGE)

Time: 3 hours Max. Marks: 60

PART-A

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

1	**a**	State Pascal's Law.	**2M**
	b	Define stream function.	**2M**
	c	Write down the applications of Bernoulli's theorem.	**2M**
	d	Define Hydraulic Gradient line.	**2M**
	e	Define Laminar & Turbulent Flow.	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	**a**	Define Manometer. Briefly explain the types of manometers in detail?	**5M**
	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 pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm.	**5M**

OR

3	**a**	Derive expression for surface tension on liquid droplet and soap bubble?	**5M**
	b	A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30º with the free surface of water. Determine the total pressure force and position of centre of pressure, when the upper edge is 2 m below the free surface.	**5M**

UNIT-II

4	**a**	Write a brief note on continuity equation for a one- dimensional flow?	**5M**
	b	The following case represent the two velocity components, determine the third velocity component such that they satisfy the continuity equation i) $u= x^2+y^2+z^2$, $v= xy^2-yz^2+xy$ ii) $v=2y^2$, $w=2xyz$	**5M**

OR

5	**a**	Define stream line, streak line and path line, stream tube and control volume?	**5M**
	b	The velocity potential function is given by Ø = 5(x2 – y2). Calculate the velocity components at the point (4, 5).	**5M**

UNIT-III

6	**a**	Derive the expression for actual discharge in venturimeter?	**5M**
	b	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.	**5M**

OR

7	**a**	What is Euler's equation of motion? How do you obtain Bernoulli's equation from it?	**5M**
	b	Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.	**5M**

UNIT-IV

8	**a**	Derive the expression for head loss in pipes due to friction by Darcy - Weisbach equation and chezy's formula.	**5M**
	b	Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 lit/s.	**5M**

OR

9	**a**	The rate of flow of water through a horizontal pipe is $0.25m^3/s$. The diameter of the pipe which is 200 mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is $1.772N/cm^2$. Determine the i) Head loss due to sudden enlargement. ii) Pressure intensity in the large pipe.	**5M**
	b	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**

UNIT-V

10	**a**	An oil of viscosity 0.1 P a.s and relative density 0.9 is flowing through a horizontal pipe of diameter 50mm. if the pressure drop per meter length of pipe is 12 Kpa. Determine a) Rate of flow in N/minute. b) Shear stress at pipe wall.	**5M**
	b	Explain the Reynolds's experiment with neat sketch.	**5M**

OR

11	**a**	An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50mm and length 300 m. The rate of flow of fluid through a circular pipe is 3.5 lit/sec. Find the pressure drop in a length of 300m and also the shear stress at the pipe wall?	**5M**
	b	Explain the any three differences between turbulent flow and Laminar flow? Explain the causes of turbulent flow.	**5M**

*** END ***