Q.P. Code: 18CE0152 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations Feb-2021

FLUID MECHANICS & FLUID MACHINES

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

PART-A

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

1	a	Define viscosity.	2M
	b	What is flow net?	2M
	c	List the minor energy losses in pipes.	2M
	d	Define dimensional homogeneity.	2M
	e	Write short notes on Draft tube.	2M

PART-B

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

UNIT-I

2	a	Define surface tension. Derive the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure.	5M
	b	The surface tension of water in contact air at 20^0 C is 0.072 N/m. The pressure inside of water droplet of water is to be 0.02 N/cm^2 greater than the outside pressure. Calculate the diameter of the droplet of water.	5M

OR

3	a	State Pascal's law. What do you understand the terms Absolute, Gauge, atmospheric & vacuum pressure?	5M
	b	What is the gauge pressure at a point 3 m 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 750 mm of mercury, the specific gravity of mercury is 13.6 and density of water = 1000 kg/m^3?	5M

UNIT-II

4	a	Derive Bernoulli's equation.	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

OR

5	a	Derive Euler's equation of motion.	5M
	b	Derive momentum equation and impulse momentum equation.	5M

UNIT-III

6	a	The following data relate to an orifice meter, diameter of the pipe = 240mm, diameter of the orifice = 120mm, specific gravity of oil = 0.88, reading of differential manometer = 400mm of mercury, coefficient of discharge of the meter is 0.65. Determine the rate of flow of oil.	5M
	b	An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauges fitted upstream, downstream of 19.62N/cm^2, and 9.81N/cm^2. Respectively. Co-efficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.	5M

OR

7		Derive the expression for flow through pipes in series and parallel.	10M

UNIT-IV

8	**a**	Write a short note on model laws.	**6M**
	b	State and derive Reynolds's model law.	**4M**

OR

9	**a**	The time period (t) of a pendulum depends upon the length (l) of the pendulum and acceleration due to gravity (g). Derive expression for time period.	**5M**
	b	The pressure drop in an aero plane model of size 1/ 10 of its prototype is 180 N/cm^2. The Model is tested in water find the corresponding pressure drop in the prototype. Take density of air =1.24 kg / m^3. The viscosity of water is 0.01 poise, while the viscosity of air is 0.00018 Poise.	**5M**

UNIT-V

10		A Francis turbine with an overall efficiency of 75 % is required to produce 148.25 kW power. It is working under a head of 7.62 m. The peripheral velocity =$0.26\sqrt{2gh}$ and the radial velocity of flow at inlet is $0.96\sqrt{2gh}$. The wheel runs at 150 r.p.m. and the hydraulic losses in the turbine are 22% of the available energy. Assuming radial discharge, determine: a) The guide blade angle b) The wheel vane angle at inlet c) diameter of the wheel at inlet d) width of the wheel at inlet.	**10M**

OR

11	**a**	Write a note on work done by the centrifugal pump (impeller) on water.	**5M**
	b	Describe briefly definition of heads and efficiencies of a centrifugal pump.	**5M**

END