Q.P. Code: 16CE112 **R16**

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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

FLUID MECHANICS & HYDRAULIC MACHINERY

(ME & AGE)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	State Pascal's law. What do you understand the terms Absolute, Gauge, atmospheric & vacuum pressure?	**6M**
	b	A hydraulic pipe has a ram of 30 cm diameter and a plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500N?	**6M**

OR

2	**a**	Derive the condition for capillary rise and capillary fall with neat sketch.	**6M**
	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 30^0 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.	**6M**

UNIT-II

3	**a**	The velocity potential function is given by Ø = 5(x2 – y2). Calculate the velocity components at the point (4, 5).	**6M**
	b	A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 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 the pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s.	**6M**

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.	**6M**
	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/cm2 and the pressure at the upper end is 9.81 N/cm2. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.	**6M**

UNIT-III

5	**a**	Derive the expression for flow through pipes in series.	**6M**
	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/m3 .	**6M**

OR

6	**a**	Explain pitot tube and pitot static tube.	**6M**
	b	An orifice meter with orifice diameter 10cm is inserted in a pipe of 20cm diameter. The pressure gauges fitted up stream and down stream of 19.62N/cm2 and 9.81N/cm2 respectively co-efficient of discharge for the meter is given as 0.6. Find the discharge of water through pipe.	**6M**

UNIT-IV

7	**a**	Describe briefly Buckingham's pi- theorem	**6M**
	b	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.	**6M**

OR

8	**a**	A pipe of diameter 1.5 m is required to transport an oil of sp.gr 0.90 and viscosity 3×10^{-2} poise at the rate of 3000 liters /s . Tests were conducted on a 15 cm diameter pipe using water at 20° C . Find the velocity and the rate of flow in the model .Viscosity of water at 20° C is equal to 0.01 poise.	**6M**
	b	In a model test of a spill way the discharge and velocity of flow over the model were 2 m^3/s and 1.5 m/s respectively . Calculate the velocity and discharge over the prototype which is 36 times the model size.	**6M**

UNIT-V

9	**a**	What is pelton turbine and discuss the parts of pelton turbine	**6M**
	b	Write a note on work done by the centrifugal pump (impeller) on water.	**6M**

OR

10		A centrifugal pump delivers water against a net head of 14.5m and a design speed of 1000 r.p.m. The vanes of curved back to an angle of 30° with the periphery. The impeller diameter is 300mm and outlet width is 50mm .Determine the discharge of the pump if manometric efficiency is 95%.	**12M**

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