R16

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Supplementary Examinations October-2020
FLUID MECHANICS & HYDRAULIC MACHINERY
(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

1 a State the Newton's law of viscosity. Differentiate kinematic viscosity and dynamic viscosity. Give their dimensions. **6M**

b A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12.0 Nm is required to rotate the inner cylinder at 100 r.p.m, determine the viscosity of the fluid. **6M**

OR

2 a State and prove hydrostatic law. **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**

UNIT-II

3 a Define the following terms: Velocity potential function, stream function, equipotential line and flow net. **8M**

b If for a 2-D potential flow, the velocity potential is given by $\emptyset = x (2y - 1)$. Determine the velocity at the point P (4, 5). Also determine the value of stream function Ψ at the point P. **4M**

OR

4 a Derive momentum equation and impulse momentum equation. **7M**

b A vertical wall is of 8 m height. A jet of water is coming out from a nozzle with a velocity of 20 m/s. The nozzle is situated at a distance of 20 m from the vertical wall. Find the angle of projection of the nozzle to the horizontal so that the jet of water just clears the top of the wall. **5M**

UNIT-III

5 a Explain pitot tube and pitot static tube. **6M**

b A sub-marine move horizontally in sea and has its axis 15 m below the surface of water. A pitot tube properly placed just in front of the sub-marine and along its axis is connected to the two limbs of a U – tube containing mercury. The difference of mercury level is found to be 170 mm. 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. **6M**

OR

6 What is a venturimeter? Derive an expression for the discharge through a venturimeter. **12M**

UNIT-IV

7 a Write a short note on dimensional homogeneity. **6M**

b Describe Rayleigh's method. **6M**

OR

8 a Write a short note on model laws. **6M**

b State and derive Reynolds's model law. **6M**

UNIT-V

9 **a** Explain the working principle of Pelton wheel turbine with a neat sketch.   **6M**

b Explain the working principle of a centrifugal pump.   **6M**

OR

10 A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head   **12M**
is 5.6 m. if the speed ratio =2.09, flow ratio = 0.68, overall efficiency = 86 % and the
diameter of the boss is 1/3the diameter of the runner. Find the diameter of the runner,
its speed and the specific speed of the turbine.

*** END ***