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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations July-2021

FLUID MECHANICS & HYDRAULIC MACHINERY

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Define and mention units for the following fluid properties: 6M
Density, specific weight, specific volume and specific gravity of a fluid.
- b Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid. 6M

OR

- 2 Derive expressions for both the total pressure and depth of center of pressure for a vertical plane surface submerged in the liquid. 12M

UNIT-II

- 3 a Define the terms: 6M
Stream line, streak line, path line, stream tube and control volume.
- b Explain different types of flow. 6M

OR

- 4 Define free vortex flow and forced vortex flow. Derive equation of motion for forced vortex flow. 12M

UNIT-III

- 5 a Explain pitot tube and pitot static tube. 7M
- 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. 5M

OR

- 6 A horizontal venturi meter with **30 cm** diameter inlet and **10 cm** throat is used for measuring the flow of water through a pipeline. If pressure in pipe is **1.5 kpa** and the vacuum pressure at the throat is **40 cm** 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 = **10 kN/m³**. 12M

UNIT-IV

- 7 a Write a short note on dimensional homogeneity. 6M
- b Describe Rayleigh's method. 6M

OR

- 8 a In 1 in 40 model of a spill way, the velocity and discharge are 2 m/s and 2.5 m³/s. 6M
Find the corresponding velocity and discharge in the prototype.
- b In a model test of a spill way the discharge and velocity of flow over the model were 2 m³/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 Describe briefly definitions of heads and efficiencies of a turbine. 12M

OR

- 10 A centrifugal pump delivers water against a net head of 14.5 m 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 300 mm and outlet width is 50 mm. Determine the discharge of the pump if manometric efficiency is 95%. 12M

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