

R18

Code No: 154AZ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, August/September - 2021

FLUID MECHANICS AND HYDRAULIC MACHINES

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Find the height through which water rises by capillary action in a glass tube of 2 mm bore if the surface tension at the prevailing temperature is 0.075-g/cm.
- b) When 12 liters of a liquid of sp.gr. 1.3 is mixed with nine liters of a liquid of Sp. gr. 0.8. and the bulk of the liquid shrinks 1% on mixing, calculate the Sp.gr, the volume and the weight of the mixture. [8+7]

- 2.a) Define the terms gauge pressure, vacuum pressure and absolute pressure? Indicate their relative positions on a chart.

- b) Prove that the pressure is the same in all directions at a point in a static fluid. [8+7]

- 3.a) Define and distinguish between:

i) Steady flow and Unsteady flow ii) Rotational and Irrotational flow.

- b) What is meant by one dimensional, two dimensional and three dimensional flows? Give the examples. [8+7]

- 4.a) When 2500 liters of water flows per minute through a 0.3m-dia pipe, which later reduces to a 0.15 diameter pipe. Calculate the velocity of flow in the two pipes.

- b) Explain how Bernoulli's equation which is valid for Irrotational fluids, can be used to solve real fluid flow problems. [8+7]

- 5.a) Explain the following terms with respect to boundary layers flows.

i) Local drag coefficient ii) Velocity defect iii) Critical roughness.

- b) Differentiate between major and minor losses in flow through pipes. [8+7]

- 6.a) A thin and long flat plate is placed with zero incidence position and parallel to a free stream of water flows over it at 6m/sec. The kinematic viscosity of water is 1×10^{-6} . At what distance from the leading edge will the laminar boundary layer over plate reaches its critical zone?

- b) Write about Venturi meter along with a neat sketch. [6+9]

- 7.a) Describe the advantages of a Kaplan turbine over Francis turbine.

- b) Describe the working of a Pelton wheel. [8+7]

- 8.a) What is an air vessel? Describe its function in reciprocating pumps.

- b) Define Static head, Manometric head and Total head.

- c) Explain briefly:

i) Manometric efficiency ii) Overall efficiency.

[6+3+6]

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