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17MT42

Fourth Semester B.E. Degree Examination, July/August 2021
Fluid Mechanics and Machines

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. Define the following properties of the fluid:
(i) Mass density (ii) Kinematic viscosity (iii) Surface tension
(iv) Dynamic viscosity (v) Specific gravity (vi) Weight density **(12 Marks)**

b. State and prove Pascal law. **(08 Marks)**

2 a. Derive an expression for hydrostatic law and state the statement of hydrostatic law. **(08 Marks)**

b. Define Manometer. Classification of Manometer. **(06 Marks)**

c. 500 Litre oil weights 60 kN. Calculate specific weight, mass density, specific volume, specific gravity. **(06 Marks)**

3 a. Define the following fluid flow:
(i) Steady and unsteady flow
(ii) Laminar and turbulent flow
(iii) Compressible and incompressible flow **(09 Marks)**

b. Derive an expression for continuity equation in 3 dimensional form with assumption. **(11 Marks)**

4 a. With assumption made, derive an expression for Bernoulies equation of motion starting from Euler equation of motion. **(10 Marks)**

b. A water is flowing through a taper pipe of length 100 mtr having diameter 600 mm at the upper end and 300 mm at lower end at the rate of 50 ltr/sec. Pipe has a slope of 1 in 30. Find the pressure at the lower end if pressure at the higher end is 19.62 N/mm^2. **(10 Marks)**

5 a. Write the procedure for solving Buckingham's π theorems and Raylie's method for solving fluid problems. **(10 Marks)**

b. Describe the following dimensionless number:
(i) Reynolds number (ii) Euler's number (iii) Webber number
(iv) Mach's number (v) Froude's number **(10 Marks)**

6 a. Derive an expression for discharge through venturimeter. **(10 Marks)**

b. Derive an expression for discharge through V-notch. **(10 Marks)**

7 a. Define turbo machine. Explain parts of turbo machines. **(08 Marks)**

b. Comparisons between turbo machines and positive displacement machines. **(08 Marks)**

c. Write classification of turbo machines. **(04 Marks)**

8 a. Derive an expression for Euler's turbine equation. **(10 Marks)**

b. Derive an expression for alternative form of Euler's equations. **(10 Marks)**

9 a. Derive an expression for maximum efficiency of Pelton turbine. **(10 Marks)**

b. With a neat sketch, explain working of Kaplan and Francies turbine. **(10 Marks)**

10 a. With a neat sketch, explain pressure compounding, velocity compounding. **(10 Marks)**

b. Derive an expression for maximum efficiency of single state steam turbine. **(10 Marks)**

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