

[Total No. of Questions - 9] [Total No. of Printed Pages - 2]
(2123)

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B. Tech 3rd Semester Examination

Fluid Mechanics (N.S.)

ME-214

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, select one question from each sections A, B, C and D. Section E is compulsory.

SECTION - A

1. What are different types of fluid? Distinguish between ideal and real fluid. Explain the importance of compressibility in fluid flow.
(20)
2. Explain how you would find the resultant pressure on a curved surface immersed in a liquid.
(20)

SECTION - B

3. Define the equation of continuity. Obtain an expression for a three dimensional flow.
(20)
4. A venturimeter is installed in a pipeline carrying water and is 30 cm in diameter. The throat diameter is 12.5 cm. The pressure in pipe line is 140 kN/m^2 , and the vacuum in the throat is 37.5 cm of mercury. Four percent of the differential head is lost between the gauges. Working from first principles find the flow rate in the pipe line in litre/sec assuming the venturimeter to be horizontal.
(20)

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SECTION - C

5. The velocity distribution in the boundary layer is given by $\frac{u}{v} = \left(\frac{y}{\delta}\right)^{1/7}$. Calculate displacement thickness, momentum thickness, and energy thickness. (20)
6. Derive an expression for shear stress on the basis of the Prandtl's mixing length theory. (20)

SECTION - D

7. Find the expression for the power transmission through pipes. Discuss the condition for maximum transmission of power and corresponding efficiency of transmission. (20)
8. Discuss non-dimensional numbers and their significance for fluid flow problems. (20)

SECTION - E

9. (a) Name important properties of fluid.
- (b) Explain dynamic viscosity.
- (c) Differentiate between uniform and non-uniform flow.
- (d) How is circulation defined?
- (e) Define stream function.
- (f) What is the function of orifice meter?
- (g) What is meant by separation of boundary layer?
- (h) What do you understand by turbulent flow?
- (i) Explain hydraulic gradient line.
- (j) Define hydraulic similitude. (2×10=20)