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B.Tech. 4th Semester (ME) Examination, May–2016

FLUID MECHANICS

Paper–ME-208-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : ***Question No. 1 is compulsory.*** *Students have to attempt* ***five*** *questions in total, at least* ***one*** *question from each section.*

1. (a) Define the ideal and real fluid. 5
   (b) What is isentropic flow ? 5
   (c) What is hydraulic gradient ? 5
   (d) What is turbulent flow ? 5

Section–A

2. A vertical dock gate separates two water reservoirs of depth H_1 and H_2. Find the resultant pressure exerted on the gate and the point of its application. If $H_1 : H_2 = 2$, to what position does this line tend as the depth of water is both sides becomes equal ? 20

3. (a) What are different types of flows ? Explain in detail. 10
   (b) Define the stream and potential function. 10

Section–B

4. (a) What is Euler's equation ? Explain in detail its importance. 10
   (b) What is impulse momentum relationship and its applications ? 10

5. (a) Explain the concept of stagnation properties in detail. 10

(b) Air flows with a velocity of 360 m/sec through a duct. At a particular section of the duct, the static pressure and temp. are 75 kPa and 300K. Assuming the flow to be reversible adiabatic find out : Mach number at the given section. 10

Section–C

6. (a) What is the relationship between shear stress and pressure gradient ? 10

(b) What are various major and minor losses in pipes? 10

7. A shaft of diameter 0.35m rotates at 200 rpm inside a sleeve 100 m long. The dynamic viscosity of lubricating oil in the 2mm gap between the sleeve and shaft is 8 poise. Find out the power lost in bearing. 20

Section–D

8. Water at 30° and atmospheric pressure flows through a smooth pipe of 5 cm I.D. The flow is fully developed and is at the rate of 2 litre/s. Find out :
   (i) Friction factor
   (ii) Pressure drop over a length of 5m.
   (iii) Thickness of laminar sub layer. 20

9. (a) What are friction coefficient for smooth and rough pipes ? 10

(b) What is Von-Karman momentum integral equation? 10