



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

II B.Tech I Sem Supply End Examination, November 2021

FLUID MECHANICS

(CIVIL)

Time: 3 Hours.**Max. Marks: 70**

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- A skater weighing 800N skates at 12m/s and is supported by an average skating area of 9cm². Determine the average thickness of thin film of
- 1 a) water that exists between the skates and the ice. Take the viscosity of water as 0.02 poise and the effective coefficient of friction between skates and ice as 0.01. Angle of inclination 30 degree 7M C01 BL3
- b) State and prove Pascal's law. 7M C01 BL1
- Write Short notes on
- 2 (i.) Vapour Pressure (ii.) Cavitation 14M C01 BL3
(iii.) Surface Tension (iv.) Capillarity
Also list some practical applications of Surface Tension and Capillarity.
- State continuity principle.
- 3 a) The diameters of a pipe at the sections 1 and 2 are 12cm and 16cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 6m/s. Determine also the velocity at section 2. 7M C02 BL2
- b) Define the following flows. Also give one example for each type of flow. 7M C02 BL2
(i.) unsteady (ii.) turbulent (iii.) irrotational (iv.) non-uniform.
- 4 In a 45° bend, a rectangular air duct of 2m² cross-sectional area is gradually reduced to 1m² area. Find the magnitude and direction of the force required to hold the duct in position if the velocity of flow at the 2m² section is 12m/s and pressure is 3.49N/cm². Take density of air as 1.18kg/m³. Also sketch the configuration. 14M C03 BL2
- 5 a) Derive Bernoulli's equation from Euler's equation. 7M C02 BL2
- b) A pipe 100m long has a slope of 1 in 50 and tapers from 1.5m diameter at the high end to 0.4m at the low end. Quantity of water flowing is 40 litres per second. If the pressure at the high end is 60kPa, find the pressure at the low end. Also sketch the configuration. 7M C03 BL2

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- 6 Write short notes on
(i.) Minor losses in pipes (ii.) Pipes in series 14M CO4 BL1
(iii.) Pipes in parallel (iv.) Total energy line and hydraulic gradient line.
- 7 Derive Darcy Weisbach equation for head loss due to friction. 14M CO4 BL2
- 8 (i.) Explain the phenomenon of separation of boundary layer by means of a neat sketch.
(ii.) What do you mean by drag and lift forces? 14M CO5 BL2
Mention any 4 applications of drag and lift forces.

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