

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examination for Academic Session 2024-25

COURSE NAME: B. TECH

SEMESTER: 3rd

BRANCH NAME: Chemical Engineering
SUBJECT NAME: FLUID MECHANICS

FULL MARKS: 30

TIME: 90 Minutes

Answer All Questions.

The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

- Q1. Answer all Questions. [2 × 3]
- a) Why viscosity of liquids decreases with increase in temperature and viscosity of gases increases with increase in temperature? - CO1
 - b) Define absolute, gauge, atmospheric and vacuum pressure? Show the relationship with suitable figure. - CO2
 - CO3

- Q2. [3+5]
- a) Write down the criteria for selection of repeating variables in Buckingham's method of dimensional analysis. - CO1
 - b) The pressure intensity at a point in a fluid is given by 3.924 N/cm². Find the corresponding height of the fluid when the fluid is (a) water, and (b) oil of sp. gr. 0.9.

OR

- a) Derive the expression of gauge pressure and vacuum pressure measured by a U-tube manometer connected to a pipe. - CO1
- b) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while left limb is connected to a pipe in which a fluid of sp. gr. 0.9 is flowing. The center of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of the fluid in the pipe if the difference of the mercury level in the two limbs is 20 cm.

- Q3. [3+5]
- a) Derive Bernoulli's equation for the flow of an incompressible frictionless fluid from the consideration of momentum. - CO2
 - b) A pipe of diameter 400 mm carries water at a velocity of 25 m/s. The pressure at the points A and B are given as 29.43 N/cm² and 22.563 N/cm² respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.

OR

- a) Derive the expression for rate of flow through venturimeter. - CO2
- b) A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of sp. gr. 0.8. The discharge of oil through venturimeter is 60 liters/s. Find the reading of the oil-mercury differential