Dr. SSBUICET, Panjab University, Chandigarh.

Subject: Strength Of Materials   **Class: BE Chemical (3rd Sem)**

Max. Marks: 20

Note: Attempt all questions.

	Course Objectives
-	CO1: Identify various types of Stresses and Strains, define Hooke's law, modulus of elasticity and modulus of rigidity, calculate stresses under impact loads and sudden applied loads under varying conditions.
-	CO2: Apply the theory to solve numerical problems based on Shearing force, bending moment, types of loads on beams, types of supports, Concentrated loads and uniformly distributed loads.
Q2	CO3: Recognize and compute Axial and Bending Loading, Torsion of Shafts, equivalent torque and equivalent bending moment and solve numerical problems based on it.
Q1(a)	CO4: Define different types of Struts and Columns, Explain Euler theory and its limitations, describe Rankine-Gordon formula and its applications to numerical problems.
Q1(b)	CO5: Describe Stresses and Strains in Thin Shells and in springs, Strain Energy and Theories of Elastic Failure and numerical problems.

Question1: (5 marks each)

a) Derive Euler's formula for column with both ends hinged.
b) A water main 90 cm diameter contains water at a pressure head of 110 m. If the weight density of water is 9810 N/mm^3, find the thickness of the metal required for the water main. Given the permissible stress as 22 N/mm^2.

Question 2: (10 marks)

A hollow steel shaft of 240 mm external diameter and 160 mm internal diameter is to be replaced by a solid alloy shaft. If both the shafts should have the same polar modulus, find the diameter of the later and the ratio of the tensional rigidities. Modulus of rigidity (C) for steel = $2.4 \times$ C for alloy. If alternatively, the two shafts should have the same torsional rigidity, find the ratio of their polar moduli.