PVP 23

Code: 23CE3302

II B.Tech - I Semester – Supplementary Examinations - MAY 2025

STRENGTH OF MATERIALS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

PART – A

1.a)	Define Poisson's ratio? Provide its significance.
1.b)	Define composite bars and their importance in engineering applications.
1.c)	What is a simply supported beam? Provide an example.
1.d)	Explain the difference between a cantilever beam and an overhanging beam.
1.e)	Explain the concept of section modulus and its significance in beam design.
1.f)	Define torsion and mention its application in circular shafts.
1.g)	State the moment area method for calculating the deflection of beams.
1.h)	Explain the significance of the elastic curve in beam deflection analysis.
1.i)	Define the term "equivalent length" in column buckling.
1.j)	State the formula for ‘hoop stress’ in a thin cylindrical shell.

PART – B

					Max. Marks
UNIT-I					
2	Explain the types of stresses and strains with suitable diagrams and examples.				10 M
OR					
3	Describe the behavior of composite bars under axial loading and how stresses are distributed among different materials.				10 M
UNIT-II					
4	Explain in detail the S.F. and B.M. diagrams for a cantilever beam subjected to uniformly distributed loads (UDL) and point load.				10 M
OR					
5	An overhanging beam has a span of 8m with a 2m overhang on the right side. The beam carries a uniformly distributed load of 4 kN/m over the entire span and a point load of 10 kN at the free end of the overhang. Determine the reactions at the supports and draw the S.F. and B.M. diagrams.				10 M
UNIT-III					
6	A beam with a rectangular cross-section 150 mm wide and 400 mm deep carries a shear force of 30 kN at a certain section. Derive the formula for shear stress distribution across the depth of the section and sketch the shear stress distribution diagram.				10 M

	OR	
7	A steel shaft of diameter 100 mm is subjected to a bending moment of 30 kNm and a torque of 20 kNm. Determine the maximum shear stress and the maximum bending stress in the shaft.	10 M
	UNIT-IV	
8	A cantilever beam of length ‘L’ is subjected to a uniformly distributed load ‘w’ over its entire span. Using Macaulay's method, determine the slope and deflection at the free end of the beam.	10 M
	OR	
9	Determine the slope at ends and deflection at the center of a simply supported beam of length ‘L’ subjected to a uniformly distributed load ‘w’ over its entire span.	10 M
	UNIT-V	
10	Derive the Euler's critical load formula for a column with one end fixed and the other end free.	10 M
	OR	
11	A thick-walled cylinder with an internal pressure of 10 MPa has an internal radius of 50 mm and an external radius of 100 mm. Using Lame’s theory, determine the maximum and minimum hoop stresses.	10 M