CE 8301 Strength of Materials- I

Important 13mark questions

Unit I

1. Derive a relation for change in length of a bar with uniformly varying diameter and subjected to an axial tensile load 'P'.
2. Derive a relation for change in length of a bar hanging freely under own weight.

Unit II

1. Derive bending formula.
2. A fixed beam AR of length 6 m carries point loads of $150\ kN$ and $120\ kN$ at a distance of 2 m and 4 m from the left end A. Find the fixed end moments and the reactions at the supports. Draw bending moment and shear force diagrams.

Unit III

1. Derive an expression for crippling load when one end of the column is fixed and the other end is force.
2. Using the double integration method derive relation for slope at the supports and maximum deflection of a simply supported beam carrying UDL of intensity w/unit length throughout the span.

Unit IV

1. Derive the relations for deflection, stiffness of a close coiled helical spring subjected to axial load.
2. Derive torsional formula.

Unit V

1. A curved bar of rectangular section 60 mm wide by 75 mm deep in the plane of bending initially unstressed is subjected to bending moment of 2.25 kNm tends to straighten the bar. The mean radius of curvature is 150 mm. Find
   (i) The position of the neutral axis.
   (ii) The greatest bending stresses.

   Draw a diagram to show approximately how the stress varies across the section

2. A curved bar is formed of a tube of 120 mm outside diameter and 7.5 mm thickness. The center line of this beam is a circular are of radius 225 mm. A bending moment of 3 kNm tending to increase curvature of the bar is applied. Calculate the maximum tensile and compressive stresses setup, in the bar.