c) How columns are classified depending upon slenderness ratio?

d) Derive an expression for finding the buckling load for a column having one end fixed and another hinged.

OR

Explain different modes of failure of a column subjected to axial load.

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Roll No .....

CE/FT - 303

B.E. III Semester

Examination, December 2015

Strength of Materials

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Define malleability and ductility.

   b) What is the purpose of Mohr's circle?

   c) A circular rod of 12.5mm was tested for tension. The total elongation on a 325 mm length was 0.23 mm under a tensile load of 18kN. Find the value of Young's modulus.

   d) Explain with mathematical derivation, thermal stresses induced in bars of tapering section due to change in temperature.

OR

Determine the percentage change in volume of a steel bar 50mm square in section and 1m long when subjected to an axial compressive load of 20kN. What change in volume would a 100mm cube of steel suffer at a depth of 5km in sea water?

Unit - II

2. a) Define flexural rigidity and its significance.

   b) Explain different types of beams with diagram.

   c) Name various methods of finding deflection in beams. Define any one method in brief.

   d) Derive the expression $M/I=E/R=\sigma/y$ for simple bending of a beam.

OR

A beam simply supported at ends A and B is loaded with two points loads of 30kN each at a distance of 2m and 3m respectively from end A. Determine the position and magnitude of the maximum deflection by double integration method.

Take $E=2\times10^5$ N/mm^2 and $I=7200$cm^4.

Unit - III

3. a) Explain different types of springs with graphical representation.

   b) What is thick cylinder?

   c) Write assumptions made by theory of pure torsion.

   d) Derive the expression of deflection of open coiled helical spring subjected to axial load.

OR

A cylindrical shells 2m long and 90cm internal diameter and 12mm metal thickness is subjected to an internal pressure of 1.6N/mm^2. Determine

   a) Maximum intensity of shear stress and

   b) Change in the dimensions of the shell

Take $E=2\times10^5$N/mm^2 and $1/m=0.3$

Unit - IV

4. a) What is a beam of uniform strength?

   b) What are the reasons for unsymmetrical bending?

   c) What do you understand by shear center?

   d) Define shear stress and show the shear stress distribution mathematically and graphically over solid circular section.

OR

Derive the expression for shear stress distribution over I-section.

Unit - V

5. a) Differentiate column and struts.

   b) Define factor of safety.