Code No: NR220102 **NR**

**II B.Tech II Semester Supplementary Examinations,**
**November/December 2005**
**STRENGTH OF MATERIALS-II**
**(Civil Engineering)**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

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1. A tie bar of cross - sectional area $1000mm^2$ is subjected to an axial tensile load of 70 kN. Find the normal, tangential and resultant stresses on a plane the normal to which makes an angle of $30^0$ with the axis of the bar. Find also the max. values of these stresses and the planes on which they act. [16]

2. (a) Explain the importance of the theories of failure of materials.
   (b) Neatly sketch the curves for different theories of failure for a two-dimensional system and briefly explain. [8+8]

3. Calculate equivalent B.M. and equivalent T.M. in the case of a shaft 80mm dia. subjected to a B.M. of 10 kN-m and a twisting moment of 15 kN-m. Find also the max. values of the direct and shear stresses induced and specify the planes on which they act. [16]

4. (a) What are springs and where they are used?
   (b) How many types of springs are there? Explain the behaviour of each type.
   (c) Give examples of the use of various types of springs? [6+6+4]

5. An R.S.Tee-section, 150mm wide × 75mm deep, thickness of flange 9mm, thickness of web 8.4mm, is used as a strut, 3 metre 4 long, ends hinged.Calculate the safe axial load by Rankines formula, using a factor of safety of 3. Rankines constants, $fc = 315N/mm^2$; a = 1/ 7500. [16]

6. (a) What do you understand by "Beam-columns"?
   (b) A horizontal strut of length L, having hinged ends, carries an axial compressive load P, and central vertical load W. Derive expression for max values of deflection, B.M. and stress. [4+12]

7. A compound cylinder is formed by shrinking one tube on to another, the final dimensions being, internal diameter 120 mm, external diameter 240 mm, diameter at junction 180 mm. if after shrinking on, the radial pressure at the common surface is $8N/mm^2$, calculate the initial hoop stresses across the sections of the inner and outer tubes. If a fluid under a pressure of $60N/mm^2$, is admitted inside the compound cylinder, calculate the final stresses set up in the sections of the pipes. [16]

8. (a) Show that the resultant max deflection in a beam under unsymmetrical bending occurs in a direction perpendicular to the neutral axis for any given direction of loading.

(b) Hence derive the expression for max deflection in a simple-supported beam Subjected to u.d.l. under unsymmetrical bending. [8+8]

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