Code No: NR220102 **NR**

II B.Tech II Semester Supplementary Examinations, April/May 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.

2. (a) Neatly represent the max. strain - energy theory graphically.
   (b) The principal stresses at a point in an elastic material are 2σ (tensile), 1.5σ (tensile) and σ (compressive). If the elastic limit in value of σ according to max. strain energy theory.

3. (a) Explain the terms torsional rigidity, torsional section modulus and polar moment of inertia.
   (b) Derive an expression for the power transmitted by a circular shaft in
      i. kW
      ii. H.P.

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?

5. A 350 mm × 165 mm R.S.joist is used as a strut, 6 metres long, one end fixed, the other hinged. Calculate the crippling load by Rankines formula. Compare this with the load obtained by the Euler formula, taking $E = 2X10^5 N/mm^2$. For what length of this strut will the two formulae give the same crippling load? For the joist, area of section = $630mm^2$ Ixx = 13158.3 $\times 10^4 mm^4$; Iyy = $631.9 \times 10^4 mm^4$. Take $fc = 315N/mm^2$.

6. (a) What are laterally loaded struts.
   (b) A horizontal strut of length L, having ends, carries an axial compressive load P and lateral u.d.l. of intensity w per unit length through out span. Derive expressions for max. Values of deflection, B.M. and stress.

7. A compound steel cylinder has a bore of 80 mm and an outside; diameter of 160 mm, the diameter at the common surface being 120 mm. Find the radial pressure at the common surface which must be provided by shrinkage if the resultant maximum hoop tension in the inner cylinder under a superimposed internal pressure of $60N/mm^2$ is to be half the value of the maximum hoop tension which would be

produced in the inner cylinder if that cylinder alone were subjected to an internal pressure of $60N/mm^2$. Determine the final hoop tensions at the inner and outer surfaces of both cylinder under the internal pressure of $60N/mm^2$ and sketch a graph to show the hoop tension varies across the cylinder wall.

8. A simply-supported beam of T-section ($100 \times 150 \times 20mm$) carries a load P at center of 2.5m span. The load line is inclined at 30' to the vertical and passes through c.g If the max. Compressive stress is not to exceed $75N/mm^2$, and the max tensile stress is not to exceed $35N/mm^2$, find the max load P which the bean can carry.

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