Code No: RR220102 **RR** **Set No. 2**

**II B.Tech II Semester Examinations,December 2010**
**STRENGTH OF MATERIALS - II**
**Civil Engineering**

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

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

⋆ ⋆ ⋆ ⋆ ⋆

1. A closely coiled helical spring is made of 20mm dia. wire coiled to a mean dia. of 200mm the number of turns being 15. If a load of 5 kN is applied, find the deflection of the spring. Find also the energy stored in the spring. [16]

2. 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]

3. (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]

4. Illustrate the application of:
   (a) Max. strain - energy theory of failure and
   (b) Max. shear strain energy theory of failure in the design of circular shaft by taking a simple example. [6+10]

5. What do you understand by circle of inertia? Using the same obtain graphically the principal moments of inertia for an unequal angle section $60 \times 40 \times 6mm$. [16]

6. A spherical shell of 90 mm internal dia. has to withstand an internal pressure of $35N/mm^2$. Find the thickness of shell required, the max. permissible tensile stress is $80N/mm^2$. [16]

7. An R.S.Tee-section, 150mm wide $\times$ 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 Rankine?s formula, using a factor of safety of 3. Rankines constants, $fc = 315N/mm^2$; a = 1/ 7500. [16]

8. (a) Explain Haigh's max. strain energy theory originally put forward by Beltrami.
   (b) Obtain the yield criterion and design criterion in the case of 3-D and 2-D stress systems. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR220102 **RR** **Set No. 4**

**II B.Tech II Semester Examinations,December 2010**
**STRENGTH OF MATERIALS - II**
**Civil Engineering**

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

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

⋆⋆⋆⋆⋆

1. A spherical shell of 90 mm internal dia. has to withstand an internal pressure of $35N/mm^2$. Find the thickness of shell required, the max. permissible tensile stress is $80N/mm^2$. [16]

2. 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 Rankine?s formula, using a factor of safety of 3. Rankines constants, $fc = 315N/mm^2$; a = 1/ 7500. [16]

3. A closely coiled helical spring is made of 20mm dia. wire coiled to a mean dia. of 200mm the number of turns being 15. If a load of 5 kN is applied, find the deflection of the spring. Find also the energy stored in the spring. [16]

4. What do you understand by circle of inertia? Using the same obtain graphically the principal moments of inertia for an unequal angle section $60 \times 40 \times 6mm$. [16]

5. (a) Explain Haigh's max. strain energy theory originally put forward by Beltrami.
   (b) Obtain the yield criterion and design criterion in the case of 3-D and 2-D stress systems. [8+8]

6. 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]

7. (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]

8. Illustrate the application of:
   (a) Max. strain - energy theory of failure and
   (b) Max. shear strain energy theory of failure in the design of circular shaft by taking a simple example. [6+10]

⋆⋆⋆⋆⋆

Code No: RR220102 **RR** **Set No. 1**

**II B.Tech II Semester Examinations,December 2010**
**STRENGTH OF MATERIALS - II**
**Civil Engineering**

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

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

⋆⋆⋆⋆⋆

1. (a) Explain Haigh's max. strain energy theory originally put forward by Beltrami.
   (b) Obtain the yield criterion and design criterion in the case of 3-D and 2-D stress systems. [8+8]

2. 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]

3. What do you understand by circle of inertia? Using the same obtain graphically the principal moments of inertia for an unequal angle section $60 \times 40 \times 6mm$. [16]

4. A closely coiled helical spring is made of 20mm dia. wire coiled to a mean dia. of 200mm the number of turns being 15. If a load of 5 kN is applied, find the deflection of the spring. Find also the energy stored in the spring. [16]

5. (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]

6. 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 Rankine?s formula, using a factor of safety of 3. Rankines constants, $fc = 315N/mm^2$; a = 1/ 7500. [16]

7. Illustrate the application of:
   (a) Max. strain - energy theory of failure and
   (b) Max. shear strain energy theory of failure in the design of circular shaft by taking a simple example. [6+10]

8. A spherical shell of 90 mm internal dia. has to withstand an internal pressure of $35N/mm^2$. Find the thickness of shell required, the max. permissible tensile stress is $80N/mm^2$. [16]

⋆⋆⋆⋆⋆

Code No: RR220102 **RR** **Set No. 3**

**II B.Tech II Semester Examinations,December 2010**
**STRENGTH OF MATERIALS - II**
**Civil Engineering**

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

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

⋆ ⋆ ⋆ ⋆ ⋆

1. Illustrate the application of:
   (a) Max. strain - energy theory of failure and
   (b) Max. shear strain energy theory of failure in the design of circular shaft by taking a simple example. [6+10]

2. A closely coiled helical spring is made of 20mm dia. wire coiled to a mean dia. of 200mm the number of turns being 15. If a load of 5 kN is applied, find the deflection of the spring. Find also the energy stored in the spring. [16]

3. (a) Explain Haigh's max. strain energy theory originally put forward by Beltrami.
   (b) Obtain the yield criterion and design criterion in the case of 3-D and 2-D stress systems. [8+8]

4. 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]

5. (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]

6. 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 Rankine?s formula, using a factor of safety of 3. Rankines constants, $fc = 315N/mm^2$; a = 1/ 7500. [16]

7. A spherical shell of 90 mm internal dia. has to withstand an internal pressure of $35N/mm^2$. Find the thickness of shell required, the max. permissible tensile stress is $80N/mm^2$. [16]

8. What do you understand by circle of inertia? Using the same obtain graphically the principal moments of inertia for an unequal angle section $60 \times 40 \times 6mm$.[16]

⋆ ⋆ ⋆ ⋆ ⋆