Code No: R050210101 **Set No.1**

II B.Tech. I Semester Regular Examinations, November -2006
STRENGTH OF MATERIALS
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Assume suitable data whereever necessary.

   A steel tube 100mm interial dia., 125mm external dia is surrounded by a brass tube of inner dia 126 mm and outer dia. 150mm. The compoud tube is subjected to an axial compressive load of 5 kN. Find the stresses developed in each tube and the load carried by each tube. Take E_s=200 GPa and E_b=100GPA. [16]

2. Sketch the S.F and B.M diagrams for an overhanging beam ABCDE, carrying a u.d.l of 2kN/m of the left overhand AB=2m, a point load of 2kN at the free end E of the right overhang DE=1m and a point load of 10kN at the centre C of the simply-supported span BD=8m. Locate the points of contraflexure. Mart the salient values. [16]

3. (a) Find the dimensions of a rectangular beam to support a u.d.l of 5kN/m over a simply supported span of 8m, if the permissible bending stress is 60 N/mm^2. Take the width = half the depth.
   (b) Explain section modulus. [12+4]

4. A beam of square section is used with one diagonal horizontal. If the S.F at the section=F and length of diagonal=d, obtain the shear-stress distribution. Sketch the same marking the salient values. Find the ratio of max. to average shear stress. [16]

5. A simply supported beam of span L carries a uniformly varying traingular load of intensity w per unit length at the right end and zero at left end. Obtain the slope at left end and central B.M. [16]

6. A thin spherical shell of 1m internal dia. and 5mm thick is filled with fluid under pressure until its volume increases by 200cc. Taking E=200 GPa and $\frac{1}{m} = 0.3$, calculate the internal pressure. [16]

7. A compound cylinder, formed by shrinking one tube on to another, is subjected to an internal pressure of 60 N/mm^2. Before the fluid is admitted the internal and external dia are 120 and 200mm and the dia. at junctiion is 160mm. If the radial pressure at the junction is $8N/mm^2$. Find the fluid stresses. [16]

8. (a) Explain the terms proof resilence, modulus of resilence, and strain energy.
   (b) Sketch the resistance deformation diagram for a bar in tension and explain it. [16]

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Code No: R050210101 **Set No.2**

II B.Tech. I Semester Regular Examinations, November -2006
STRENGTH OF MATERIALS
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Assume suitable data wherever necessary

   A specimen of dia. 13mm and gauge 50mm is tested under tension. At 20kN load the extension was observed to be 0.0315mm. Yielding occurred at a load of 35kN and the ultimate load was 60kN. The final gauge-length at fracture was 70mm. Calculate the Young's modulus of the materials, percentage elongation, yield stress and ultimate strength. [16]

2. A simply supported beam of span L, carries a uniformly varying triangular load of intensity zero at left support and ω per unit length at the right end. Obtain the S.F and B.M diagrams. Mark the salient values on these diagrams. [16]

3. (a) A beam of circular section has to carry a u.d.l of 27.5 kN/m over a span of 4m. If the permissible bending stress is $70N/mm^2$ find the dia. of section.
   (b) Explain the term section modulus. [12+4]

4. A triangulsr section (b×h) is subjected to an S.F=F at a certain section. Obtain the shear stress distribution and sketch the same. Find the ratio of max. to average shear stress. [16]

5. A simply supported beam of span 6m carries two point loads of 60kN and 50kN at 1m and 3m from the left end. Find the position and magnitude of max. deflecltion. Take E=200 GPa and I=8500cm^4. [16]

6. Desire the formulae for longitudinal and circumferential stresses in a thin cylinder subjected to internal pressure. [16]

7. A thick seamless speherical shell of 80mm internal dia. has to withstand an internal pressure of 30 N/mm^2. Calculate the thickness of shell, if the max. permissible tensile stress is $80N/mm^2$. [16]

8. Calculate the strain energy in a bar 3m long, 40mm in dia. subjected to a tensile load of 100kN. Take E=200Gpa. Find also the modulus of resilience. [16]

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Code No: R050210101 **Set No.3**

II B.Tech. I Semester Regular Examinations, November -2006
STRENGTH OF MATERIALS
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Assume suitable data wherever necessary.
   Two rods, are made of steel and other of brass hang vertically, 1m apart, from a rigid support. Both rods are 1m long. The rods support a rigid bar horizontally. When a load of 25kN is placed at 40cm from the steel rod on the horizontal bar, the extension of the two rods are found to be equal. If the area of steel rod is $300mm^2$, find the stresses and strains in the rods and the area of the brass rod. Take E_S=200Gpa and $E_b = 85$ Gpa. [16]

2. A Simply supported beam of span 10m carries a uniformly varying load of intensity 1kN/m at the left end 4kN/m at the right end. Obtain the S.F and B.M diagrams. Mark the salient values on the diagrams. [16]

3. (a) Derive the simple bending relation
   $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$
   (b) State the assumptions made in the derivation. [12+4]

4. A circular section of dia. d is subjected to an S.F = F at a certain section. Obtain the shear stress distribution and sketch the same. Find the ratio of max. to arrange shear stress. [16]

5. A simply supported beam of span 8m carries a partial u.d.l of intensity 5kN/m and length 2m, starting from 2m from the left end. Find slope at left support and central deflection. [16]

6. A boiler of 2m dia is made of 20mm thick plates. If the max. tensile stress is not to exceed 100 N/mm^2, find the permissible steam pressure in the boiler, taking the efficiency of longitudinal riveted joint as 75%. Calculate the longitudinal stress, if the efficiency of circumferential joint is 65%. [16]

7. Calculate the thickness of metal required for a thick cylinder of internal dia. 80 mm to with stand an internal pressure of $25N/mm^2$, if the max. permissible tensile stress is limited to$125N/mm^2$. [16]

8. A bar of 60mm dia. 4m long hangs vertically. A weight of 30kN falls by 10mm on the collar securely attached at its lower end. Find the max. stress induced. $E = 200N/m^2$. [16]

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Code No: R050210101 **Set No.4**

II B.Tech. I Semester Regular Examinations, November -2006
STRENGTH OF MATERIALS
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Assume suitable data whatever necessary.

   A steel wire 2m long and 3mm in dia. elongates by 0.75mm when a weight W is suspended from the wire. If the same load is suspended from the brass wire 2.5m long and 2mm dia, it is elongated by 4.64mm. Find the modulus of elasticity of brass, if the modulus of elasticity of steel E_s=200Gpa. [16]

2. An overhanging beam ABCD supported at B and D has an overhang of AB=3m on the leftside. It carries a load of 8kN at the point C, distance 3m from D. Also there is a u.d.l of 2kN/m over the length AC=12m. Obtain the S.F and B.M diagrams. Mark he salient points on the diagram. Locate the point of contraflexure. [16]

3. An I-beam of 200mm depth is simply supported over an effective span of 8m. Find the u.d.l which it can carry if the bending stresses in tension and compression are limited to 30 and 45 N/mm^2. I_{NA}=5935.5cm^4, y_b=87.38mm, y_t=112.62mm. [16]

4. A beam of rectangular section (b×d) is subjected to an S.F=F at a certain section. Obtain the shear stress distribution. Sketch the same, marking the salient values. Find the ratio of max. to average shear stress. Will the stress diagram remain same if the beam is used with one diagonal vertical? [16]

5. A simply supported beam of span 8m carries a central load of 8kN and a u.d.l of 4 kN/m over the whole span. Find the central deflection and slope at ends, if E=200 Gpa and I=$1 \times 10^{-4} m^4$. [16]

6. A thin cylinder of 1m dia and 3m long is subjected to an internal pressure of $1.5N/mm^2$. The thickness of metal is 1.5mm. Find the longitudinal stress, hoop stress, change in length, and change in volume. E=200Gpa and $\frac{1}{m} = 0.3$. [16]

7. Derive Lame's formulae for finding the hoop stress and radial pressure in a thick cylinder. [16]

8. A weight of 1.2kN is dropped on a collar attached at the lower end of a vertical bar 4m long and 30mm in dia. Find the height of drop, if the max. instantaneous stress is not to exceed 120 N/mm^2. Find also the instantaneous elongation E=200 Gpa. [16]

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