**B.E. 2/4 (MECH) 1 SEM. MAIN EXAMINATION, NOV/DEC-2009**

**MECHANICS OF MATERIALS…………..**

***Answer all questions of Part A. answer five questions from Part B***

**PART-A**

1. **State and explain Hook’s law.**
2. **Explain the effect of change of temperature in a composite bar.**
3. **What do you understand by the term, point of contraflexuture ?**
4. **Describe the procedure for finding out the slope and defection of a cantilever beam of a composite section.**
5. **Define flexural rigidity and torsional rigidity.**
6. **Skectch the shear stress distribution in a circular shaft.**
7. **Write the significance of Mohr’s circle and its uses.**
8. **Distinguish between circumferential stress and longitudinal stress in a cylindrical shell when subjected to an internal pressure.**
9. **What do you mean by the terms column and strut? Distinguish clearly between columns and short columns.**
10. **Give the assumptions for determining the stresses in the bending of cured bars.**

**PART-B**

1. **A copper rod, 25 mm in diameter is encased in steel tube 30mm internal diameter and 35mm external diameter. The ends are rigidity attached. The composite bar is 500mm long and is subjected to an axial pull of 30kN. Find the stress induced in the rod and the tube. Take E for steel = 2\*10^5 N/mm^2 and E for copper = 1\*10^5 N/mm^2.**
2. **A horizontal beam, 30m long, carries a uniformly distributed load of 10kn/m over the whole length and a concentrated load of 30kN at the right end. If the beam is freely support at the left end, find the position of the second support so that the bending moment on the beam should be small as possible. Draw the diagrams of shearing force and bending moment and insert the principal values.**
3. **At a point in an elastic material under strain, there are normal stresses of 50 N/mm^2 and 30 N/mm^2, respectively at right angles to each other with a shearing stress of 25 N/mm^2. Find the principal stresses and the position of principal planes if**
4. **50 N/mm^2 is tensile and 30 N/mm^2 is also tensile**
5. **50 N/mm^2 is tensile and 30 N/mm^2 is compressive.**

**Find also the maximum shear stress and its plane in both the cases.**

1. **A 30cm\*16 cm rolled steel joint of I-section has flanges 11mm thick and web 8mm thick. Find the safe uniformly distributed load that this section will carry over a span of 5m if the permissible skin stress is limited to 120 N/mm^2.**
2. **Derive the expression for the deflection of a simply supported beam when subjected to a central point load by double integration method.**
3. **Compare the crippling loads given by Euler’s and Rankine’s formula for a tubular steel strut 2.3 m long having outer and inner diameter 38mm and 33mm respectively, loaded through pin joints at each end. Take the yield stress as 335N/mm^2. The Rankine’s constant = 1/7500 and E=0.205\*10^6 N/mm^2. For what length of strut of this cross-section does the Euler formula cease to apply?**
4. **A C.I. pipe has 20cm internal diameter and 50mm metal thickness, and carries water under a pressure of 5N/mm^2. Calculate the maximum and minimum intensities of circumferential stress and sketch the distribution of circumferential stress intensity and the intensity of radial pressure across the section.**