Reg. No. _____

Karunya University

(Karunya Institute of Technology and Sciences)

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – November/December 2010

Subject Title: MECHANICS OF SOLIDS **Time: 3 hours**

Subject Code: CE203 **Maximum Marks: 100**

Answer ALL questions

PART – A (10 x 1 = 10 MARKS)

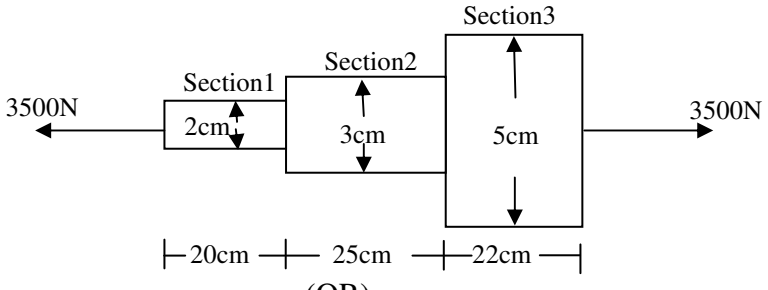
1. What is modulus of Resilience?
2. Define Poisson ratio.
3. Draw the BM diagram of a Simply Supported beam subjected to UDL of w/unit run over the entire span '*l*'.
4. What is mean by Point of contraflexure?
5. Define Section modulus.
6. What do you mean by 'bending stress in a beam'?
7. What are principal stresses?
8. What is Mohr's circle of stresses?
9. Give the equation of deflection by moment area method.
10. Define Slenderness ratio.

PART – B (5 x 3 = 15 MARKS)

11. Find the minimum diameter of a steel wire, which is used to raise a load of 4000N if the stress in the rod is not to exceed 95MN/m^2.
12. Draw the S.F and B.M diagrams for a cantilever of length 'L' carrying a point load 'W' at the free end.
13. What is meant by simple bending? What are the assumptions made in its theory?
14. Draw a Mohr's circle of stresses when a body is subjected to the mutually perpendicular principal stresses of unequal intensities.
15. Derive an expression for the slope and deflection of a beam subjected to uniform bending moment.

PART – C (5 x 15 = 75 MARKS)

16. An axial pull of 35000N is acting on a bar consisting of three lengths as shown in figure. If the Young's modulus = 2.1x10^5N/mm^2, determine:
    a. Stresses in each section and b. Total extension of the bar



(OR)

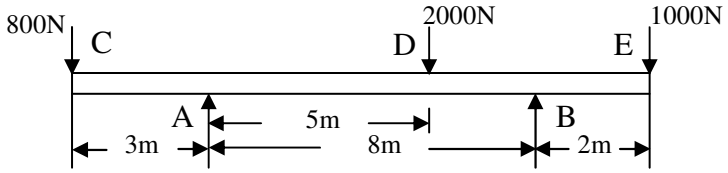
17. Determine the changes in length, breadth and thickness of a steel bar which is 4m long, 30mm wide and 20mm thick and is subjected to an axial pull of 30kN in the direction of its length. Take E=2x10^5N/mm^2 and Poisson's ratio = 0.3

[P.T.O]

18. A beam of length 12m is simply supported at two supports which are 8m apart, with an overhang of 2m on each side. The beam carries a concentrated load of 1000N at each and. Draw S.F and B.M diagrams.

(OR)

19. Draw the S.F and B.M diagrams for the beam which is loaded as shown in Figure. Determine the points of contraflexure within the span AB.



20. A steel plate of width 60mm and of thickness 10mm is bent into circular arch of radius 10m. Determine the maximum stress induced and bending moment which will produce the maximum stress. Take $E=2x10^5 N/mm^2$

(OR)

21. A timber cantilever 200mm wide and 300mm deep is 3m long. It is loaded with a U.D.L of 3kN/m over the entire length. A point load of 2.7kN is placed at the free end of the cantilever. Find the maximum bending stress produced.

22. An elemental cube is subjected to tensile stress of $30N/mm^2$ and $10N/mm^2$acting on two mutually perpendicular planes and a shear stress of $10N/mm^2$ on these planes. Draw the Mohr's circle of stresses and hence or otherwise determine the magnitudes and direction of principal stresses and also the greatest shear stress.

(OR)

23. At a point in a strained material, on plane BC there are normal and shear stress of $560N/mm^2$ and $140N/mm^2$ respectively. On plane AC, perpendicular to plane BC there are normal shear stresses of $280N/mm^2$ and $140N/mm^2$ respectively. Determine the following
    a. Principal stresses and location of the planes on which they act
    b. Maximum shear stress and the plane on which it acts.

24. A beam of length 6m is simply supported at its ends. It carries a uniform distributed load of 10kN/m at 1m distance from left support and 2m from right support. Determine the deflection of the beam at its mid-point and also the position and the maximum deflection. Take $EI=4.5x10^8 N/mm^2$

(OR)

25. A beam of length 10m is simply supported at its ends and carries two point loads of 100kN and 60kN at a distance of 2m and 5m respectively from the left support. Calculate the deflections under each load. Find also the maximum deflection. Take $I=18x10^8 mm^4$ and $E=2x10^5 N/mm^2$.