KUMARAGURU
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Register Number: ……..

B.E. DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Third Semester

CIVIL ENGINEERING

CEE103: Mechanics of Solids

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The deformation per unit length is called
   a) Strain b) Tensile stress
   c) Compressive stress d) Shear stress
2. The combined effect of external forces acting on a body is called
   a) Stress b) Strain
   c) Load d) None of the above
3. A member under tension is called
   a) Strut b) Tie
   c) Strut – Tie d) Column
4. Which of the following are usually considered as thin cylinder
   a) Boilers b) Tanks
   c) Steam pipes d) All of the above
5. In a cantilever with UDL the shear forces varies following a
   a) Linear law b) Parabolic law
   c) Either of the above d) None of the above
6. Circular beams of uniform strength can be made by varying diameter in such a way that
   a) M/Z is constant b) σ/y is constant
   c) E/R is constant d) M/R is constant
7. The deflection at the free end of a cantilever of length ‘l’ carrying a point load W at its free end is given as
   a) Wl/2EI b) $Wl^2/2EI$
   c) $Wl^3/2EI$ d) $Wl^3/3EI$

8. If the bending moment is consistent there will be no …….. stresses

a) Tensile b) Compressive

c) Shearing d) None of the above

9. For the same material length and given torque a hollow shaft weights….. a solid shaft

a) Less than b) More than

c) Equal to d) None of the above

10. ……. are called cantilever laminated springs

a) Semi elliptical springs b) Quarter elliptical springs

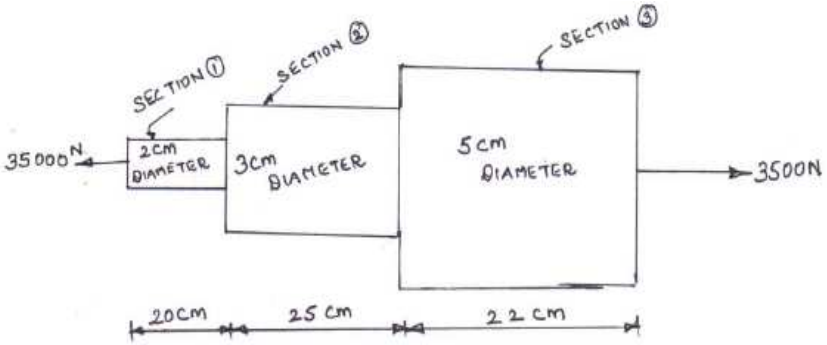
c) Both (a) and (b) d) None of the above

PART B (10 x 2 = 20 Marks)

11. List the methods to find the stresses in oblique plane?
12. Differentiate between the principal planes and principal stresses
13. What are the methods for Analysis the frame?
14. Mention the types of stresses are developed in cylinder when subjected to internal fluid pressure
15. In which point the bending moment is maximum?
16. Write the assumption in the theory of simple bending?
17. Explain the Theorem for conjugate beam method?
18. How will you obtained shear stress distribution for unsymmetrical section?
19. What are the assumptions made in Torsion equation
20. What are the differences between closed coil & open coil helical springs?

PART C (5 x 14 = 70 Marks)

21. a) An axial pull of 3500 N is acting on a bar consisting of three lengths as shown in Figure 1. If the young's modulus $2.1x10^5$ N/mm^2. Determine i) stresses in each section and ii) Total extension of the bar.

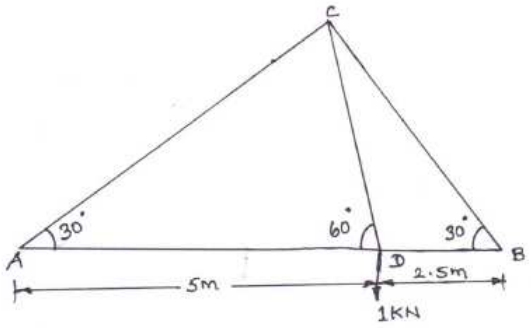


(OR)

b) At a point within a body subjected to two mutually perpendicular directions, the

stresses are 80 N/m^2 tensile and 40 N/m^2 tensile. Each of the above stresses is accompanied by shear stresses of $60N/mm^2$. Determine the normal stress, shear stress at an angle of 45 degree with the axis of minor tensile stress.

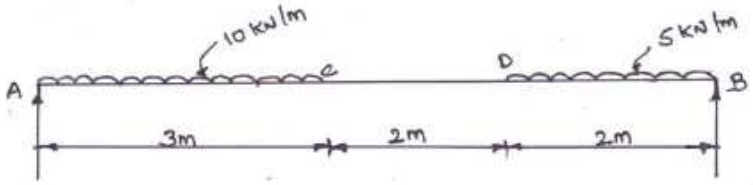
22. a) A truss of span 7.5m carries a point load of 1 kN at joint D as shown Figure 2. Find the reactions and forces in the members of the truss.



(OR)

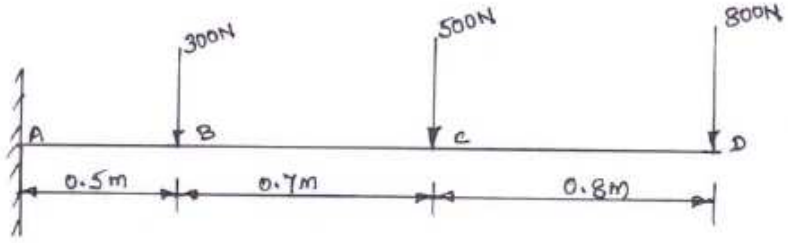
b) A cylindrical pipe of diameter 1.5m and thickness 1.5cm is subjected to an internal fluid pressure of 1.2 N/mm^2. Determine a) Longitudinal stress developed in the pipe, b) Circumferential stress developed in the pipe.

23. a) Draw the shear force and bending moment of a simply supported beam of length 7m carrying UDLs as shown in Figure 3.



(OR)

b) A cantilever beam of length 2m carries the point loads as shown in Figure 4. Draw the shear force and bending moment diagrams for the cantilever beam.



24. a) A beam of length 6m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1m and 3m respectively from the left support. Find, i) Deflection under each load ii) Maximum deflection iii) The point load at which maximum deflection occurs. Take E = $2x10^5$ N/mm^2 and I= 85 $x10^6$ mm^4

(OR)

b) A rectangular beam 100mm wide and 250mm deep is subjected to a maximum shear force of 50kN. Determine i) Average shear stress ii) Maximum shear stress iii) shear stress at a distance of 25 mm above the neutral axis.

25. a) In a hollow circular shaft of outer and inner diameters of 20cm and 10cm respectively. The shear stress is not to exceed 40 N/mm^2. Find the maximum torque which the shaft can safely transmit.

(OR)

b) The stiffness of a closed coiled helical spring is 1.5 N/mm of compression under a maximum load of 60 N. The maximum shearing stress produced in the wire of the spring is 125 N/mm^2. The solid length of the spring is given as 5cm; Find i) Diameter of wire ii) Mean diameter of the coils iii) Number of coils required. Take C= $4.5x10^4$ N/mm^2

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