2/15/13

B.E DEGREE EXAMINATIONS , APRIL/MAY 2013

INDUSTRIAL,MANUFACTURING,MINING ENGINEERING AND PRINTING TECHNOLOGY

III SEMESTER

CE 9213 STRENGTH OF MATERIALS

Time : 3 Hours Max.Marks: 100

Answer ALL questions

Part-A (5x2=10 marks)

1. A short bar of length 100mm tapers uniformly from a diameter 40mm to a diameter of 20mm and carries an axial compressive load of 100kN. Find the change in length of the bar. E=210kN/mm^2
2. State and explain Hooke's law.
3. Draw the shear force diagram for a cantilever beam of 2m span carrying a point load of 10 kN at midspan.
4. Draw the shear stress distribution in an T-section due to bending.
5. What are the two conditions to be satisfied in the design of a circular shaft
6. How do you identify close coiled helical spring?
7. State Maxwell's Reciprocal theorem?
8. Sketch any two conjugate beams and the corresponding real beams.
9. State any two theories of failure?
10. Write down the expressions for hoop and longitudinal stresses in thin cylinders.

Part-B (5x16=80 marks)

11. Draw the shear force and bending moment diagrams for the beam shown in Fig.Q.11. and locate the points of contraflexure if any.

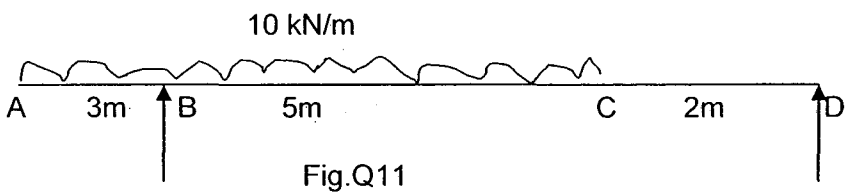

Fig.Q11

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12.a) Stresses at a point are p_x= -60N/mm^2, p_y = -40N/mm^2, q=75 N/mm^2. Determine principal planes , principal stresses and maximum shear stress.

(or)

b. Three tubes A,B,C are fitting loosely one over the other. Tube A is inside and tube C is Outside. Each tube has a thickness of 10mm and length of 300mm. Inner tube A has internal diameter of 100mm. If an axial load of 150 kN is applied, find load carried by each tube , change in length of each tube and stress in each tube. Take E_A=200 kN/mm^2,E_B=100 kN/mm^2,E_C=50 kN/mm^2.

13a) A closed coiled helical spring is to have a stiffness of 900N/m in compression with a maximum load of 45N and maximum shearing stress of 120N/mm^2. The solid length of the spring (i.e., coils are touching)is 45 mm. Find the diameters and the number of coils. G=40kN/mm^2.

(or)

b) A hollow shaft with diameter ratio 3/5 is required to transmit 900 kW at 60 rpm. The shear stress in the shaft is not to exceed 60 N/mm^2 and the twist in a length of 5 m must not exceed 2°. Calculate the diameters of the shaft. Take G = 8 x 10^4 N/mm^2.

14.a) Find deflection at C and maximum deflection for the beam shown in fig.Q.14.a.
E = 2 x 10^5 N/mm^2, I = 3 x 10^{7}mm^4.

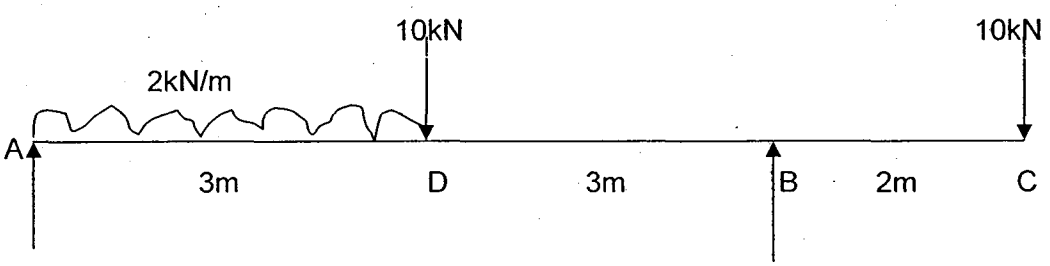

Fig.Q14a

(or)

b) Using conjugate beam method, compute deflection at C, slope at A and slope at B for the beam shown in Fig.Q.14.b. Take E = 2 x 10^5 N/mm^2 and I = 8 x 10^7 mm^4.

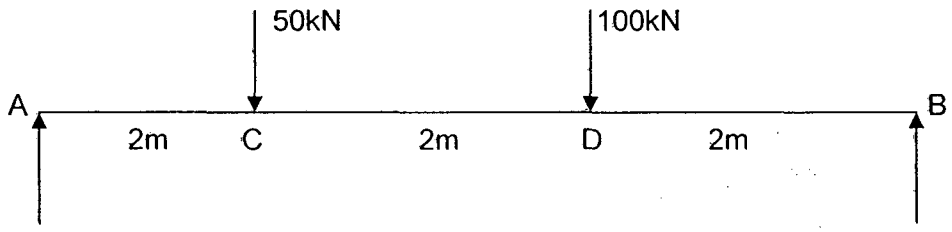

Fig.Q14b

15a) A cylindrical shell is 3 m long, 1.2 m internal diameter and 15 mm wall thickness. It is subjected to an internal pressure of 1.5 N/mm^2. Find the change in length, change in diameter and change in volume. E=204 kN/mm^2, ν=0.3

(or)

b) Find the thickness of metal necessary for thick cylindrical shell of internal diameter 200mm to withstand an internal pressure of 20N/mm^2. The hoop stress in the section is not to exceed 60N/mm^2.

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