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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

CIVIL ENGINEERING

FOURTH SEMESTER

CE 9251 STRENGTH OF MATERIALS-II

(Regulation 2008)

Time : 3 Hours Max.Marks: 100

Answer ALL questions

Part-A (10x2=20 marks)

1. State Catigliano's theorem.

2. A solid circular shaft is 4 m long and has a diameter 80 mm. Find the torsional strain energy stored in it ,when it is subjected to a torque of 200 Nm. G = 80 GPa.

3. A propped cantilever beam supported at the free end is subjected to an udl of w kN/m over the entire span. Find the propped end reaction.

4. What is the effect of sinking or rotation in a fixed beam.

5. What is the buckling load of a Euler's column hinged at both the ends and length is 5m. EI=30000 kNm^2.

6. Define slenderness ratio.

7. List the theories of failure suitable for ductile materials.

8. What are stress invariants?

9. Draw a sketch of an I section and mark the shear center location

10. When will you use Winkler Bach theory?

Part-B (5x16=80 marks)

11. Analyse the three span continuous beam shown in FigQ11.Draw the shear force and bending moment diagrams. Take EI constant.

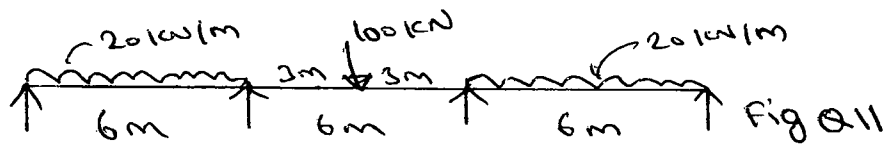

Fig Q11

12a. Find the deflection under the load of a simply supported beam of 8m span carrying an Concentrated load of 50 kN at its mid-span. EI=40000 kNm^2. Use energy method.

(OR)

b. Calculate the vertical deflection at the joint B of the truss shown in Fig12b.Assume AE = 2×10^5 kN for all the members.

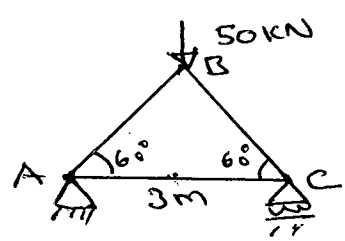

Fig Q12b

13a. Derive the expression for the buckling load of an Euler's column hinged at both ends.

(OR)

b. A hollow cast iron column outside diameter is 200 mm and has a thickness of 20 mm. It is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine-Gordon formula using a factor of safety of 4. Take σy = 550 MN/m^2 and a = 1/1600.

14a. The state of stress at a point is given by the tensor below. Determine the principal stresses.

$$\begin{bmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{bmatrix} \text{ MPa}$$

(OR)

b. A mild steel shaft 120 mm diameter is subjected to a maximum torque of 20 kNm and a maximum bending moment of 12 kNm at a particular section. Find the factor of safety according to the maximum shear stress theory if the elastic limit in simple tension is 220 MN/m^2.

15a. A pipe of 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MN/m^2.Calculate the maximum and minimum intensities of circumferential stresses across the section and also sketch the circumferential stresses distribution across the section.

(OR)

b. Write short notes on
i)Un-symmetrical bending
ii)Residual stresses
iii)Stress concentration
iv)Fatigue and fracture

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