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Question Paper Code: 54103

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Civil Engineering

15UCE403-MECHANICS OF SOLIDS - II

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. The statement that "If unit loads rest upon a beam at the two points A and B, then the deflection at A due to unit load at B is equal to the deflection at B due to unit load at A is given by CO1- R
(a) Mohr (b) Castigliano (c) Maxwell (d) Rankine
2. A cantilever of length(l) carries a point load(W) at the free end. The downward deflection at the free end is equal to CO2- R
(a) $Wl^3/8EI$ (b) $Wl^3/3EI$ (c) $5Wl^3/384EI$ (d) $Wl^3/48EI$
3. A fixed beam is a beam whose end supports are such that the end slopes CO3- R
(a) are maximum (b) are minimum
(c) are zero (d) any value greater than 1
4. The ratio of crippling load, for a column of length(l) with both ends fixed to the crippling load of the same column with both ends hinged is equal to CO4- R
(a) 2.0 (b) 4.0 (c) 0.25 (d) 0.50

5. Product of Inertia of a rectangle with breadth 'b' and depth 'd' is CO5- R
- (a) $bd^3/12$ (b) $bd^3/3$ (c) $bd^2/6$ (d) Zero

PART – B (5 x 3= 15Marks)

6. Define Strain Energy. CO1- R
7. What are the methods for finding out the slope and deflection at a section? CO2- R
8. Write the formula for deflection of a fixed beam with uniformly distributed load. CO3- R
9. Define Equivalent length of the column. CO4- R
10. What are the reasons for unsymmetrical bending? CO5- R

PART – C (5 x 16= 80Marks)

11. (a) A solid bar is 20 mm dia. And 0.8 m long. It is subjected to a torque of 30 Nm. Calculate the maximum shear stress and the strain energy stored. Take modulus of rigidity as 90GPa CO1- App (16)

Or

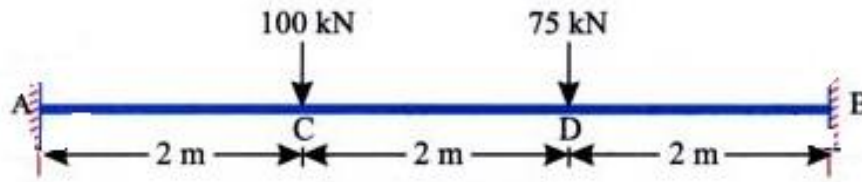
- (b) A simply supported beam AB of length 6m carries a point load 40KN at 2m from left support A. Using the principle of virtual work, determine the deflection under the load if $EI=2800 \text{ kn.m}^2$. CO1- App (16)

12. (a) Find the slope and deflection at the mid span of the simply supported beam of span L subjected to a uniformly distributed load of intensity "w" kN/m over the entire span using Moment area method. CO2- App (16)

Or

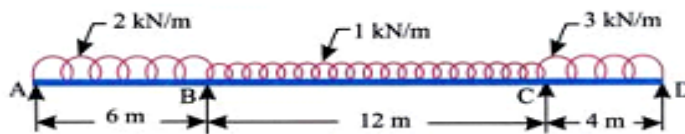
- (b) A simply supported beam of span 10m carries point loads of 90 KN and 60 KN at 3m and 4.5m from left and right ends respectively. Using Macaulay's method, calculate the deflection under the loads if $E=210 \times 10^6 \text{ KN/m}^2$, $I=64 \times 10^6 \text{ KN/m}^4$. CO2- Ana (16)

13. (a) A fixed beam carries point loads as shown in fig. Draw the S.F and B.M diagrams. CO3- Ana (16)



Or

- (b) Analyze the beam shown in fig. and draw the B.M diagram. CO3- Ana (16)



14. (a) Find out the Euler crippling load for a cantilever column. CO4- U (16)

Or

- (b) Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2 . CO4- Ana (16)

15. (a) Find out the principal moment of inertia of the angle section 80 mm x 80 mm x 10 mm. CO5- U (16)

Or

- (b) A channel section has flanges 12 cm x 2cm and web 16 cm x 1cm. Determine the shear centre of the channel. CO5- U (16)

