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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations July-2021

STRENGTH OF MATERIALS - I

(Civil Engineering)

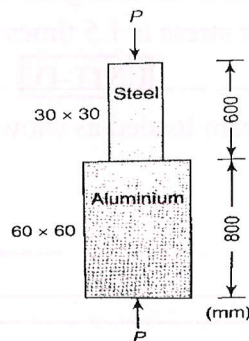
Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

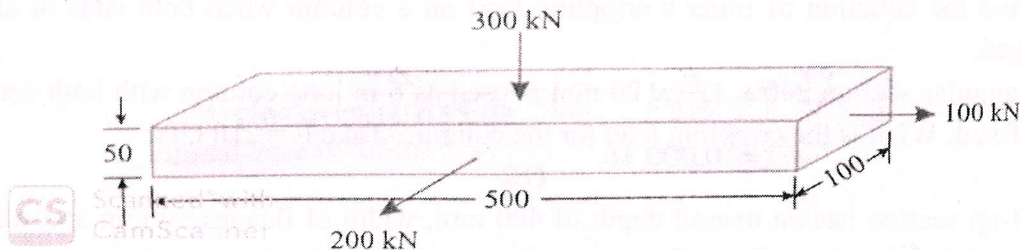
UNIT-I

- 1 a A prismatic member of length l is having a uniform cross-sectional area A is subjected to a load P along the longitudinal axis. What will be the change in length δl due to application of load P . **6M**
- b A steel bar of 25 mm diameter is acted upon by force as shown in figure below. What is the total elongation of the bar, if $E = 190$ GPa? **6M**



OR

- 2 A rectangular bar 500 mm long and 100 mm x 50 mm in cross-section is subjected to forces as shown in the figure. What is the change in the volume of the bar? Take modulus of elasticity for the bar material as 200 GPa and Poisson's ratio as 0.25. **12M**

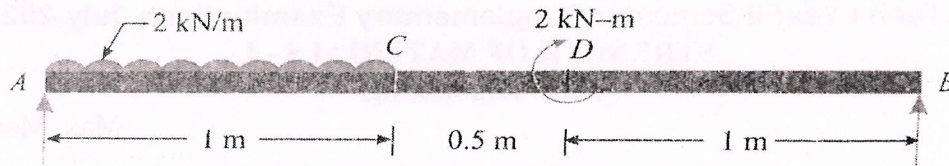


UNIT-II

- 3 A cantilever of 14 m span carries loads of 6 kN, 4 kN, 6 kN and 4 kN at 2 m, 4 m, 7 m and 14 m respectively from the fixed end. If also has a uniformly distributed load of 2 kN/m run for the length between 4 m and 10 m from the fixed end. Draw the shear force and bending moment diagrams. **12M**

OR

- 4 A simply supported beam of span 2.5 m is subjected to a uniformly distributed load and a clockwise couple as shown in figure. Draw the shear force and bending moment diagrams. 12M



UNIT-III

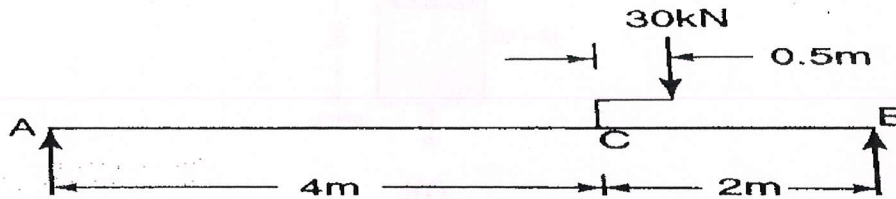
- 5 a A timber beam of rectangular section supports a load of 20 kN uniformly distributed over a span of 3.6 m. If depth of the beam section is twice the width and maximum stress is not to exceed 7 MPa, find the dimensions of the beam section. 6M
- b A circular log of timber has diameter 'D', Find the dimensions of the strongest rectangular section to resist moment one can cut from this log. 6M

OR

- 6 a Draw the shear stress distribution for a rectangular section of width 'b' and depth 'd'. 5M
- b Draw the shear stress distribution of triangular section of width 'b' and height 'h'. 7M
Prove that the maximum shear stress is 1.5 times the average shear stress.

UNIT-IV

- 7 Find the deflection at C in the beam loaded as shown in figure below. Take $EI = 10000 \text{ kN-m}^2$. 12M



OR

- 8 Derive the expression for slope and deflection of a cantilever beam carrying a point load at the free end by Moment Area method. 12M

UNIT-V

- 9 a Derive the equation of Euler's crippling load on a column when both ends of are hinged. 6M
- b An angular section 240 x 120 x 20 mm is used as 6 m long column with both ends are fixed. What is the crippling load for the column? Take $E = 210 \text{ GPa}$. 6M

OR

- 10 A built up section has an overall depth of 400 mm, width of flanges 50 mm and web thickness 30 mm. It is used as a beam with simply supported ends and it deflects by 10 mm when subjected to a load of 40 kN/m length. Find the safe load if this I-section is used as a column with both ends hinged. Use Euler's formula. Assume a factor of safety 1.75 and take $E = 2 \times 10^5 \text{ N/mm}^2$. 12M

*** END ***