Code: 13A01301 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

STRENGTH OF MATERIALS – I

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) How is shear strain defined?

(b) Define Poisson's ratio.

(c) Explain about bending moment.

(d) What is shear force at free end of a cantilever beams with point load of end?

(e) What are the assumptions made in deriving the bending equation?

(f) Define section modulus.

(g) What is meant by flexural rigidity?

(h) Explain terms slope and deflection.

(i) What is Kernal of a section?

(j) Give example for finding slope and deflection using conjugate beam method.

PART – B

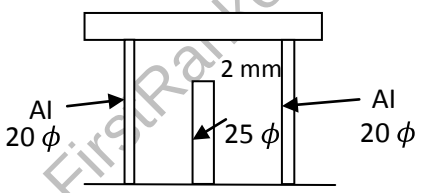
(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Two aluminium bars and a brass bar support a load of 50 kN as shown in figure. Due to error in fabrication, the brass bar is 0.2 mm shorter than required. Find the stresses in the bars when a load of 50 kN is applied.

E_a = 70 GPa

E_b = 105 GPa



OR

3 A rectangular block $250\ mm \times 100\ mm \times 80\ mm$ is subjected to axial load as follows: 480 kN tensile in the direction of its length, 1000 kN compressive on the $250\ mm \times 100\ mm$ faces and 900 kN tensile on 250 × 80 mm faces. Assuming Poisson's ratio as 0.25, find in terms of modulus of elasticity of the material E and the strain in the direction of each force. If $E = 2 \times 10^5\ N/mm^2$, find the values of the modulus of rigidity and bulk modulus for the material of the block. Also calculate the change in volume of the block due to loading.

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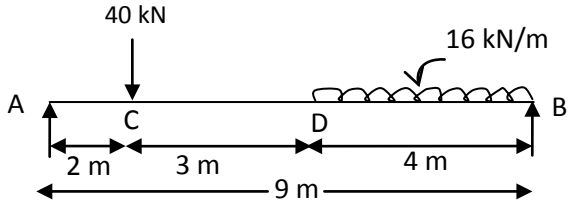
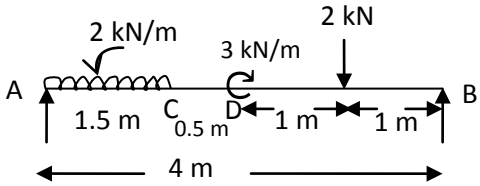
UNIT - II

4 A simply supported beam of 9 m span as loaded in figure below. Draw BMD and SFD indicating principal values.



OR

5 A beam AB of length 4 m is acted upon by forces and moments as shown in figure below. Sketch BM and SF diagrams.



UNIT - III

6 A simple beam carries a U.D.L of 15 kN/m (including self weight) over its entire span of 4 m. If the permissible stresses for timber are 12 MPa in compression, 10 MPa in tension, and 0.8 MPa in shear, design a suitable rectangular beam. Take the width of rectangular beam as one third of the depth.

OR

7 A beam of triangular cross section with base b and height h is used with the base horizontal. Determine the maximum shear stress and plot the variation of shear stress intensity along the section.

UNIT - IV

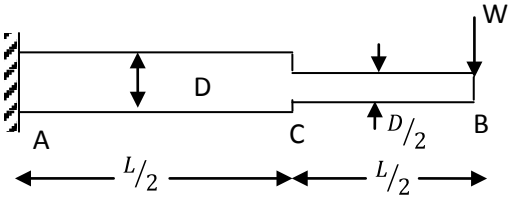
8 A beam simply supported at ends A and B is loaded with two point loads of 60 kN and 50 kN at distance 1 m and 3 m respectively from end A. Determine the position and magnitude of deflection. Take $E = 2 \times 10^5\ N/mm^2$ and $\mathrm{I} = 8500\ cm^4$.

OR

9 A S.S beam carries a UDL of 20 kN/m over its span of 8 m. Determine the slope at the ends and the deflection at mid span by moment area method if $E = 200\ GN/m^2$ and $\mathrm{I} = 30{,}000\ cm^4$.

UNIT - V

10 A cantilever of length L carries a point load W at its free end. The member is circular in section having diameter D for a distance $L/2$ from the fixed end and a diameter $D/2$ for the remaining length. Find the slope and deflection at point C and B by conjugate beam method.



OR

11 A square chimney 30 m high has a flue opening of size $1.5\ m \times 1.5\ m$. Find the minimum width required at the base for no tension if the masonry weighs 20 kN/m^2 and the wind pressure is 1.5 kN/m^2. Permissible stress in the masonry is 1 N/mm^2.

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