

Government polytechnic, Jajpur

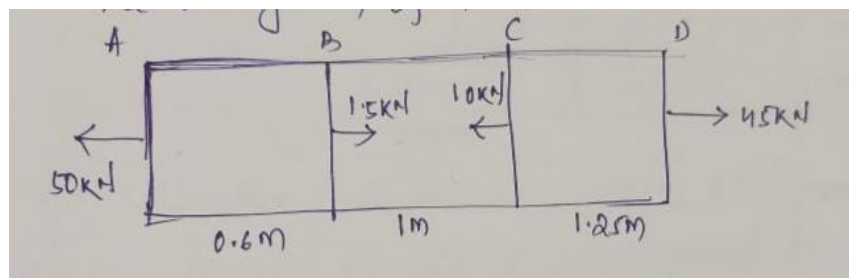
3rd sem . Civil

Structural mechanics

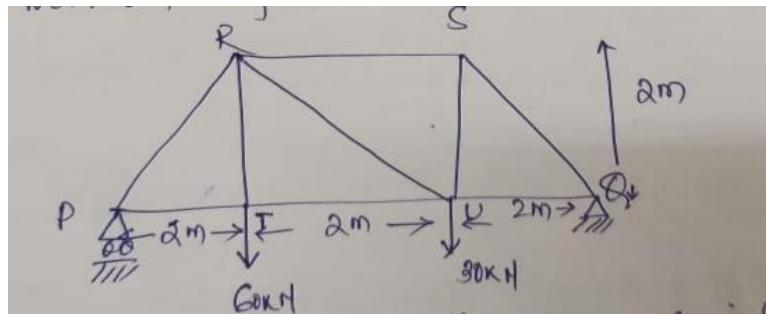
1. (a) Define poisson's ratio ? 2 marks
(b) State hook's law ?
(c) Define torsional rigidity ?
(d) What is section modulus ?
(e) Define point of contraflexure ?
(f) Differentiate between statically determinant & statically indeterminate structure?
(g) Write down the equation for the maximum deflection of a simply supported beam subject to point load ?
(h) What is mohr's circle and what is its uses ?
(i) Define flexural rigidity ?
(j) Define perfect frame ?
(k) what is an isotropic materials ?

5 marks

1. Draw the neat sketch of stress and strain diagram for mild steel & explain the salient point's in detail ?
2. A steel rod 5m long & 50mm ϕ is used as column with one end is fixed & other free ? Determine crippling load ?
3. Derive the slope and deflection of a cantilever beam with a point load at its free end by double integration method ?
4. Write down the assumption in theory of simple bending ?
5. A steel bar section 500mm^2 is acted upon by the forces as in figure . Determine the total elongation of the bar . Consider $E= 2 \times 10^5 \text{ N/MM}^2$.



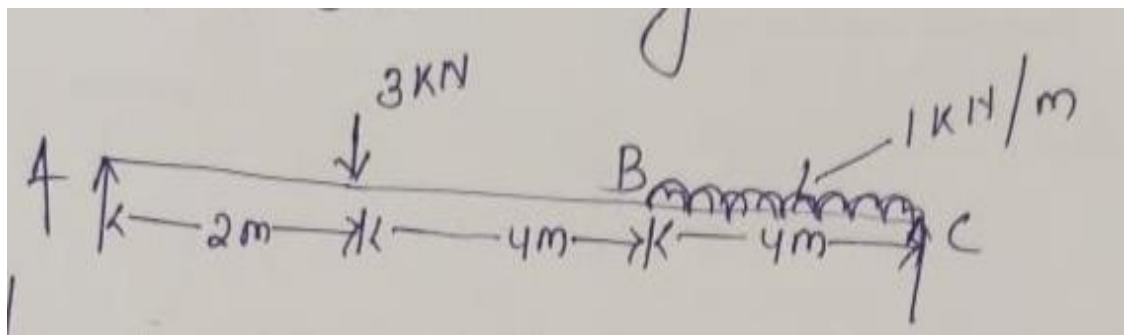
6. Find the forces in all members with their nature as tensile or compressive as shown in figure using method of joint .



7. Find the moment of inertia of a 'T' section with flange as 150mm x50mm about 'xx' and 'yy' axis through the C.G. of the section ?

10 marks

1. A continuous beam ABC 10 metre long rests on three support A,B and C at the same level and is loaded as shown in figure .



Determine the moments over the beam and draw the bending moment . Also calculate the reaction at the support and draw shear force diagram using theorem of three moments.

- A rectangular Column of width 200mm and of thickness 160mm carries a point load of 200kN at an eccentricity of 10mm . Determine the maximum and minimum stress on the section .
- A steel rod 4m long and 30 mm diameter is used as a column with both end fixed . Determine the crippling load by Euler's formula .
Take $E = 2 \times 10^5 \text{ N/MM}^2$.
- Find maximum slope and deflection for a simple supported beam with a UDL over the span by double integration method .