

Question Bank (G scheme)

Name of subject: STRENGTH OF MATERIAL

Subject code: 17304

Semester: III

Unit Test :I

Course : ME

TEST- 1

Questions of 3 marks

Chapter-1 (Simple stress and strain)

- 1) Define elasticity and plasticity.
- 2) What do you mean by stress? State its unit.
- 3) State the types of stresses.
- 4) Define Hook's law.
- 5) What do you mean by Modulus of Rigidity?
- 6) State Poisson's Ratio.
- 7) Draw Stress- Strain diagram for ductile material.
- 8) State and explain thermal stress.
- 9) What is the relation between E,G and K.
- 10) Define Bulk Modulus.

Chapter-2 (Bending Moment and Shear stress)

- 1) List the various types of beams.
- 2) Draw SFD and BMD for a simply supported beam of span 'L' carrying central point load 'W'.
- 3) What do you mean by point of contra shear?
- 4) Draw SFD and BMD for cantilever beam of span 'L' carrying point load 'W' at the free end.
- 5) Define Shear force and Bending moment.

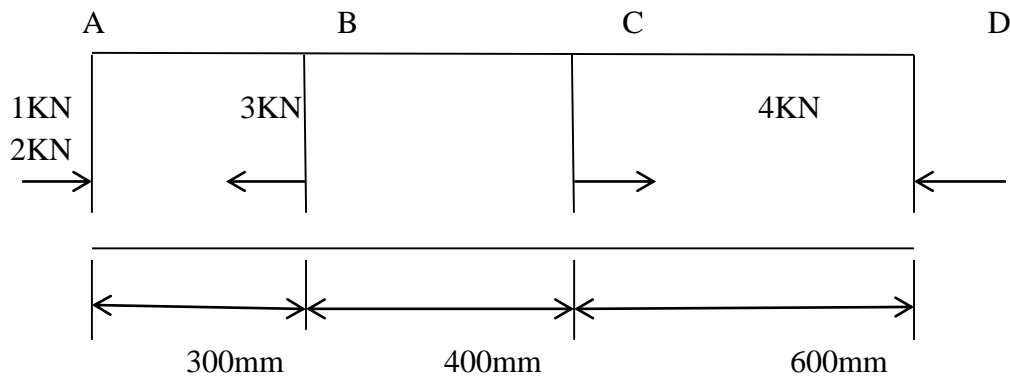
Chapter-3 (Moment of Inertia)

- 1) What do you mean by Moment of Inertia?
- 2) Define Radius of gyration.
- 3) State Parallel axis theorem.
- 4) State Perpendicular axis theorem.
- 5) State the value of M.I. of a semi-circle of radius 'R' about centroidal XX and YY axes.
- 6) State value of M.I. of triangle about- base, centroidal axis and apex.

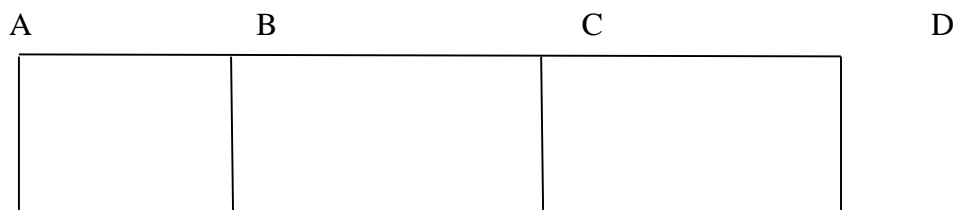
Questions of 4 marks

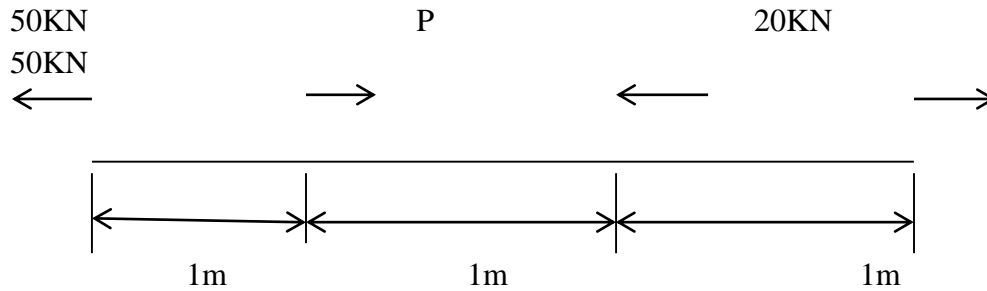
Chapter 1:- (Simple stress and strain)

- 1) In a tension test, a metallic rod of diameter 16mm produces an elongation of 48mm when subjected to 90KN load. The length of the rod is 150mm. Find modulus of elasticity.
- 2) A rod is 2m long at 10⁰C, find the expansion of the rod when the temperature is raised to 80⁰C. If the expansion is prevented, find the stress in the material. Take $E= 1 \times 10^5 \text{N/mm}^2$ and $\alpha= 0.000012/^{\circ}\text{C}$.
- 3) A steel rod 500mm long and 20mm x 10mm in cross-section is subjected to an axial load pull of 300KN. If the modulus of elasticity is $2 \times 10^5 \text{MPa}$, calculate stress, strain and elongation of the rod.
- 4) A wire, 4mm in diameter, 4m long is subjected to an axial pull of 1890N. It is stretched by 3mm under the axial pull. Find the value of stress, strain and modulus of elasticity.
- 5) A rod has a length of 10m at 10⁰C and its temperature is raised to 70⁰C. If the free expansion is prevented, find the magnitude and nature of stress produced. Take $E= 210 \text{KN/mm}^2$ and $\alpha=12 \times 10^{-6}/^{\circ}\text{C}$.
- 6) For a certain material, modulus of elasticity is 169MPa. If Poisson's ratio is 0.32, calculate the values of modulus of rigidity and bulk modulus.
- 7) Young's modulus for a certain metal is 120KN/mm^2 . If Poisson's ratio is 0.29. Find the values of other two modullai.
- 8) A bar of uniform cross-sectional area 100mm^2 is subjected to the forces as shown in fig. below. Calculate the change in the length of the bar. Take $E= 2 \times 10^5 \text{N/mm}^2$.



- 9) A circular bar having 200mm^2 area is subjected to the axial loads as shown in fig. blow. Find the value of 'P' and total elongation. Take $E= 2 \times 10^5 \text{N/mm}^2$.





Chapter-2 (Bending Moment and Shear stress)

- 1) A simply supported beam of span 7m carries a udl of 2kN/m over 4m length from left hand support and a point load of 5kN at 2m from right support. Draw SFD and BMD.
- 2) A simply supported beam of span 7m carries a udl of 2kN/m over 3m from left support and two point loads of 3kN at 3m from left support and 5kN at 2m from right support. Draw SFD and BMD.
- 3) A cantilever beam of span 2.5m carries three point loads of 1kN, 2kN and 3kN at 1m, 1.5m and 2.5m from the fixed end. Draw SFD and BMD.
- 4) Draw SFD and BMD for a cantilever beam of span 3m which carries a udl of 0.8m over a length of 1.5m from free end and a point load of 2 kN at 1.5m from fixed end.
- 5) A simply supported beam of 5m span carries two point loads of 5kN and 7kN at 1.5m and 3.5m from left hand support respectively. Draw SFD and BMD.
- 6) A beam of span 6m carries a udl of 1.5kN per meter run over the entire span and two point loads of 4kN and 5kN at 2m and 4m from the left support. Draw SFD and BMD.

Chapter-3 (Moment of Inertia)

- 1) Find the moment of inertia of a square of side 'a' about its outer edge.
- 2) Find M.I. of a rectangle 60mm x 200mm about its 200mm edge.
- 3) Calculate M.I. of circular section having 50mm diameter.
- 4) Find the M.I. of triangle of base 140mm and height 100mm about base, centroidal axis and apex.

5) Find M.I. of semi-circular section of diameter 200mm about XX and YY axes.