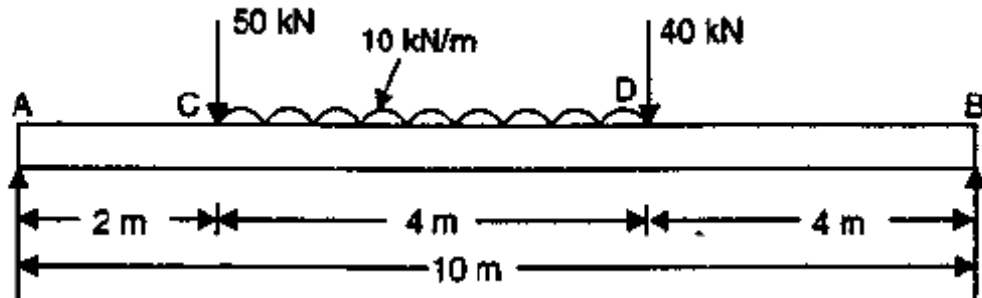


UNIT 2- SHEAR AND BENDING IN BEAMS**PART – A (2 Marks)**

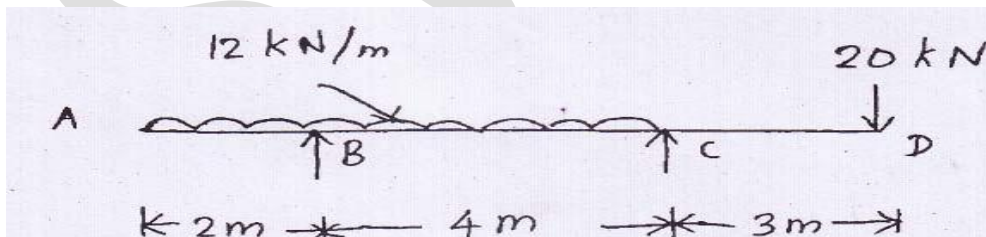
1. What is the maximum bending moment for a simply supported beam subjected to uniformly distributed load and where it occurs?
2. Define shear stress.
3. What is shear force in a beam?
4. What is bending moment in a beam?
5. List the types of supports
6. Derive the relation between bending moment and shear force.
7. What is meant by section modulus?
8. What is the differential relation between bending moment, shear force and the applied load?
9. Sketch the shear stress variation for symmetrical I section
10. What do you mean by point of contraflexure?
11. What is meant by moment of resistance of a beam?
12. Write any four assumptions in the theory of simple bending
13. Differentiate between hogging and sagging bending moment.
14. Sketch any 2 types of supports used for a beam indicating the reactions in each case.
15. A cantilever beam of span 4m is subjected to a udl of 2 kN/m over its entire length. Sketch the bending moment diagram for the beam.
16. How would you find the bending stress in unsymmetrical sections?
17. How do you locate the point of maximum bending moment?
18. What do you understand by neutral axis & moment of resistance? How do you locate Neutral axis?
19. A beam subjected to a bending stress of 5N/mm^2 and the section modulus is 3530 cm^3 . What is the moment of resistance of the beam?
20. Draw the S.F. & B.M. diagrams for simply supported beam of length L carrying a point load W at its middle point.

PART – B (16 Marks)

1. A simply supported beam of length 10m carries the uniformly distributed load and two point loads as shown in Fig. Draw the S.F and B.M diagram for the beam and also calculate the maximum bending moment.



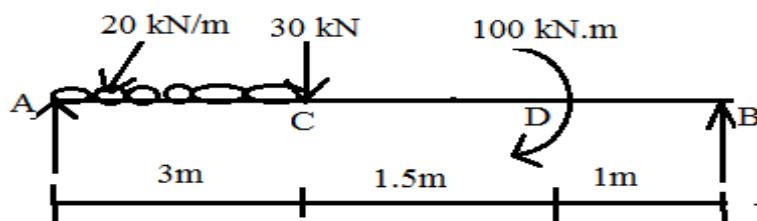
2. (i) Derive an expression for bending moment equation (8)
- (ii) A rectangular beam 300 mm deep is simply supported over the span of 4 m. Determine the uniformly distributed load per metre which the beam may carry, if the bending stress should not exceed 120N/mm^2 . Take $I=8\times 10^6\text{ mm}^4$. (8)
3. A cantilever beam of 2 m long carries a uniformly distributed load of 1.5 kN/m over a length of 1.6 m from the free end. Draw shear force and bending moment diagrams for the beam.
4. A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end. Draw shear force and bending moment diagrams for the beam and also calculate the maximum bending moment on the beam.
5. Draw shear force and bending moment diagram for the beam given in Fig.



6. State the assumptions made in the theory of simple bending and derive the bending formula.
7. A 100mm X 200mm rolled steel I section has the flanges 12mm thick and web 10mm thick. Find
 - (i) The safe udl the section can carry over a span of 6m if the permissible stress is

limited to 150 N/mm^2

- (ii) The maximum bending stress when the beam carries a central point load of 20 kN .
8. The cross section of T beam is as follows: Flange thickness = 10 mm ; width of the flange = 100 mm ; thickness of the web = 10 mm ; depth of the web = 120 mm ; If a shear force of 2 kN is acting at a particular section of the beam draw the shear stress distribution across the section.
9. An overhanging beam ABC is simply supported at A & B over a span of 6 m and BC overhangs by 3 m . If the supported span AB carries a central concentrated load of 8 kN and overhang span BC carries 2 kN/m draw the shear force and bending moment diagram.
10. A simply supported beam of span 4 m carries a udl of 6 kN/m over the entire span. If the maximum allowable stress due to bending is restricted to 150 N/mm^2 , determine the cross sectional dimensions if the section is;
- (i) Rectangular with depth twice the breadth
- (ii) Solid circular section
- (iii) Hollow circular section having a diameter ratio of 0.6
11. Draw shear force and bending moment diagram for the beam shown in Fig.



12. A flitched beam consists of two timber joist 100 mm wide and 240 mm deep with a steel plate 180 mm deep and 10 mm thick placed symmetrically between the timber joists and well clamped. Determine
- i) The maximum fibre stress when the maximum fibre stress in wood is 80 kg/cm^2 .
- ii) The combined moment of resistance if the modular ratio is 18 .

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