CENTRAL POLYTECHNIC COLLEGE, THARAMANI-600 113.
(An Autonomous Institution)

# DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

## ECE31010 – MECHANICS OF MATERIALS

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<tr><td colspan="2">STRESSES IN BEAMS DUE TO BENDING Types of Bending stresses–Neutral axis–Theory of simple bending– Assumptions–Moment of resistance – Flexure/bending equation $M / I = E / R = \sigma/y$ (Derivation not required)– Bending stress distribution –Curvature of beam–Position of N.A and centroidal axis–Stiffness equation–Flexural rigidity–</td><td>9</td></tr>
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| Strength equation–Significance of Section modulus–Numerical Problem on simply supported beam with symmetrical loads only. | | |
| **UnitV** | **PIN JOINTED FRAMES** | |
| ANALYSIS BY ANALYTICAL METHOD(METHODOFJOINTS) Definitions of: Frame / Truss, Pin Joint, Nodes, Rafters, Ties, Struts, Slings- Determinate and indeterminate frames–Classification of frames-Perfect and imperfect frames–Deficient/Instable and redundant frames-Resolutions of force-Designation of forces-Nature of force in the frame-Identification of member with zero force in a determinate truss- Methods of analysis-Analytical methods-Method of Joints and Method of Sections (Description only) - Problems on Analysis of cantilever (with not more than eight members) with vertical nodal loads by method of joints only ) and simply supported perfect frames(with not more than ten members) with vertical nodal loads (Symmetrical frame only) by method of joints only. | | 9 |
| **TOTAL HOURS** | | **45** |

**U.NO Q NO QUESTIONS**

1 1 The ability of a material to deform under load and return to its original shape when the load is removed is known as:
(a) Rigidity (b) Elasticity
(c) Plasticity (d) Brittleness
**Ans:Elasticity**

1 2 What is the term for the resistance of a material to scratching or indentation?
(a) Hardness (b) Tenacity
(c) Malleability (d) Creep
**Ans:Hardness**

1 3 Which type of stress is a result of forces pulling the material apart?
(a) Compressive stress (b) Tensile stress
(c) Shear stress (d) Torsional stress
**Ans:Tensile stress**

1 4 Strain is defined as the ratio of:
(a) Change in length to original length (b) Stress to original length
(c) Force to area (d) Force to volume
**Ans:Change in length to original length**

1 5 The ratio of lateral strain to longitudinal strain within the elastic limit is known as:
(a) Young's Modulus (b) Shear Modulus
(c) Bulk Modulus (d) Poisson's Ratio
**Ans:Poisson's Ratio**

1 6 For a steel bar under tension, the longitudinal strain is 0.001. What is the lateral strain if the Poisson's ratio is 0.3?
(a) 0.003 (b) 0.0003
(c) 0.0006 (d) 0.001
**Ans:0.0003**

1 7 The law that states stress is directly proportional to strain within the elastic limit is:
(a) Newton's Law (b) Hooke's Law
(c) Poisson's Law (d) Pascal's Law
**Ans:Hooke's Law**

1 8 The slope of the stress-strain curve within the elastic limit represents which of the following?
(a) Poisson's Ratio (b) Modulus of Rigidity
(c) Bulk Modulus (d) Young's Modulus of Elasticity
**Ans:Young's Modulus of Elasticity**

1 9 What is the other name for Shear modulus?
(a) Bulk Modulus (b) Modulus of Rigidity
(c) Young's Modulus (d) Poisson's Ratio
**Ans:Modulus of Rigidity**

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 1 | 11 | The relationship between the elastic constants E, G, and K is given by which of the following?<br>(a) $E=2G(1+\mu)$ (b) $E=3K(1-2\mu)$<br>(c) $E=9KG/(3K+G)$ (d) All of the above<br>**Ans:All of the above** |
| 1 | 12 | The property of a material to withstand permanent deformation without fracture is known as:<br>(a) Elasticity (b) Plasticity<br>(c) Brittleness (d) Toughness<br>**Ans:Plasticity** |
| 1 | 13 | The ability of a material to be hammered or rolled into thin sheets without fracturing is called:<br>(a) Ductility (b) Malleability<br>(c) Tenacity (d) Brittleness<br>**Ans:Malleability** |
| 1 | 14 | Creep is the deformation of a material over a long period under a constant:<br>(a) Temperature (b) Stress<br>(c) Strain (d) Load<br>**Ans:Stress** |
| 1 | 15 | If a bar is stretched, the lateral strain will cause the diameter to:<br>(a) Increase (b) Decrease<br>(c) Stay the same (d) First increase then decrease<br>**Ans:Decrease** |
| 1 | 16 | The volumetric strain is the change in volume divided by the:<br>(a) Original length (b) Original area<br>(c) Original volume (d) Change in length<br>**Ans:Original volume** |
| 1 | 17 | A force of 500 N is applied along the axis of a bar with a cross-sectional area of 10 mm2. The stress is:<br>(a) 50 N/mm2 (b) 5000 N/mm2<br>(c) 5 N/mm2 (d) 500 N/mm2<br>**Ans:50 N/mm2** |
| 1 | 18 | Hooke's law is valid only for which part of the stress-strain curve?<br>(a) The plastic region (b) The elastic region<br>(c) The fracture point (d) The ultimate stress point<br>**Ans:The elastic region** |
| 1 | 19 | Which of the following is an example of a compressive force?<br>(a) A cable pulling a weight (b) A pillar supporting a roof<br>(c) A rope being stretched (d) A beam being bent<br>**Ans:A pillar supporting a roof** |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 1 | 21 | A material that fractures with little or no plastic deformation is considered to be:<br>(a) Ductile (b) Brittle<br>(c) Tough (d) Malleable<br>**Ans:Brittle** |
| 1 | 22 | What is the term for the resistance of a material to fracture under a sudden impact?<br>(a) Brittleness (b) Toughness<br>(c) Fatigue (d) Tenacity<br>**Ans:Toughness** |
| 1 | 23 | A bar is stretched by a force. The ratio of the decrease in its diameter to the original diameter is:<br>(a) Longitudinal strain (b) Lateral strain<br>(c) Volumetric strain (d) Shear strain<br>**Ans:Lateral strain** |
| 1 | 24 | The ratio of tensile stress to tensile strain within the elastic limit is:<br>(a) Shear Modulus (b) Young's Modulus<br>(c) Bulk Modulus (d) Poisson's Ratio<br>**Ans:Young's Modulus** |
| 1 | 25 | What is the ratio of shear stress to shear strain within the elastic limit called?<br>(a) Young's Modulus (b) Shear Modulus<br>(c) Bulk Modulus (d) Poisson's Ratio<br>**Ans:Shear Modulus** |
| 1 | 26 | Bulk Modulus is the ratio of:<br>(a) Volumetric stress to volumetric strain (b) Shear stress to shear strain<br>(c) Normal stress to volumetric strain (d) Normal stress to longitudinal strain<br>**Ans:Volumetric stress to volumetric strain** |
| 1 | 27 | The relationship between E, G, and K is derived from the assumption of:<br>(a) Homogeneous and isotropic material (b) Anisotropic material<br>(c) Orthotropic material (d) All of the above<br>**Ans:Homogeneous and isotropic material** |
| 1 | 28 | A 2 m long bar elongates by 1 mm under a load. What is the strain?<br>(a) 0.005 (b) 0.0005<br>(c) 0.05 (d) 0.5<br>**Ans:0.0005** |
| 1 | 29 | A cube with a side length of 20 mm is subjected to a shear force of 500 N. The shear stress is:<br>(a) 1.25 N/mm2 (b) 2.5 N/mm2<br>(c) 0.25 N/mm2 (d) 12.5 N/mm2<br>**Ans:1.25 N/mm2** |

| U.NO | Q NO | QUESTIONS | |
|---|---|---|---|
| 2 | 1 | A support that resists both vertical and horizontal forces but allows rotation is a: | |
| | | (a) Roller support | (b) Hinge support |
| | | (c) Fixed support | (d) Sliding support |
| | | **Ans:Hinge support** | |
| 2 | 2 | A beam supported by a hinged support at one end and a roller support at the other is a: | |
| | | (a) Cantilever beam | (b) Simply supported beam |
| | | (c) Propped cantilever beam | (d) Overhanging beam |
| | | **Ans:Simply supported beam** | |
| 2 | 3 | What does the diagrammatic representation of a cantilever beam show? | |
| | | (a) Two hinged supports | (b) One fixed support and one roller support |
| | | (c) One fixed support and no other support | (d) Two roller supports |
| | | **Ans:One fixed support and no other support** | |
| 2 | 4 | A beam that cannot be analyzed using only the static equilibrium equations is called a/an: | |
| | | (a) Determinate beam | (b) Indeterminate beam |
| | | (c) Stable beam | (d) Unstable beam |
| | | **Ans:Indeterminate beam** | |
| 2 | 5 | The internal resisting force that acts parallel to the cross-section of a beam is called: | |
| | | (a) Bending moment | (b) Shear force |
| | | (c) Normal force | (d) Torsional force |
| | | **Ans:Shear force** | |
| 2 | 6 | For a cantilever beam with an endpoint load, the maximum shear force is at the: | |
| | | (a) Free end | (b) Fixed end |
| | | (c) Mid-span | (d) Entire-span |
| | | **Ans:Entire-span** | |
| 2 | 7 | A cantilever beam with a UDL over its entire span has its maximum bending moment at the: | |
| | | (a) Free end | (b) Fixed end |
| | | (c) Mid-span | (d) Quarter-span |
| | | **Ans:Fixed end** | |
| 2 | 8 | For a simply supported beam with a central point load, the maximum bending moment is at the: | |
| | | (a) Supports | (b) Quarter-span |
| | | (c) Mid-span | (d) Free end |
| | | **Ans:Mid-span** | |
| 2 | 9 | A simply supported beam with a UDL over its entire span has a shear force diagram that is a: | |
| | | (a) Horizontal line | (b) Vertical line |
| | | (c) Inclined straight lines | (d) Parabolic curve |
| | | **Ans:Inclined straight lines** | |

| U.NO | Q NO | QUESTIONS | |
|---|---|---|---|
| 2 | 11 | For a cantilever beam with a UDL over the half-length from the fixed end, the shear force diagram is a: | |
| | | (a) Rectangle | (b) Triangle |
| | | (c) Parabola | (d) Trapezoid |
| | | **Ans:Parabola** | |
| 2 | 12 | What is the maximum beding moment of a simply supported beam of length L carring a point load W on the mid span? | |
| | | (a) WL | (b) WL/2 |
| | | (c) WL/4 | (d) WL/8 |
| | | **Ans:WL/4** | |
| 2 | 13 | In a simply supported beam, the shear force at the supports due to a central point load is equal to: | |
| | | (a) The total load | (b) Half the total load |
| | | (c) Zero | (d) Twice the total load |
| | | **Ans:Half the total load** | |
| 2 | 14 | What is the bending moment at the fixed end of a cantilever beam of span L with a single point load W at its free end? | |
| | | (a) WL | (b) WL/2 |
| | | (c) WL/4 | (d) WL/8 |
| | | **Ans:WL** | |
| 2 | 15 | Which of the following is a type of uniformly varying load? | |
| | | (a) A trapezoidal load | (b) A UDL |
| | | (c) A concentrated load | (d) An axial load |
| | | **Ans:A trapezoidal load** | |
| 2 | 16 | A simply supported beam with a central point load has its bending moment diagram in the shape of a: | |
| | | (a) Rectangle | (b) Triangle |
| | | (c) Parabola | (d) Inclined line |
| | | **Ans:Triangle** | |
| 2 | 17 | For a cantilever beam with an endpoint load, the Bending Moment Diagram is a: | |
| | | (a) Straight line | (b) Parabolic curve |
| | | (c) Triangular shape | (d) Horizontal line |
| | | **Ans:Triangular shape** | |
| 2 | 18 | A load that is spread over a specific length of the beam is a: | |
| | | (a) Concentrated load | (b) Point load |
| | | (c) Distributed load | (d) Axial load |
| | | **Ans:Distributed load** | |
| 2 | 19 | What is the bending moment at the fixed end of a cantilever beam with a UDL over its entire span? | |
| | | (a) wL^2/2 | (b) wL/2 |
| | | (c) wL | (d) wL2 |
| | | **Ans:wL^2/2** | |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 2 | 21 | A cantilever beam of length L is subjected to a point load P at the free end. The shear force at any section is:<br>(a) PL/2 (b) P<br>(c) PL (d) PL<br>**Ans:P** |
| 2 | 22 | The bending moment at the fixed end of a cantilever beam of length L with a point load P at the mid-span is:<br>(a) P (b) PL<br>(c) PL/8 (d) PL/2<br>**Ans:PL/2** |
| 2 | 23 | What is the bending moment at the supports of a simply supported beam?<br>(a) Positive (b) Negative<br>(c) Zero (d) Maximum<br>**Ans:Zero** |
| 2 | 24 | The Shear Force Diagram of a simply supported beam with a central point load is:<br>(a) A triangle (b) A rectangle<br>(c) Two rectangles (d) A parabola<br>**Ans:Two rectangles** |
| 2 | 25 | In a simply supported beam, a point of zero shear force corresponds to the point of:<br>(a) Zero bending moment (b) Maximum bending moment<br>(c) Zero slope (d) Maximum slope<br>**Ans:Maximum bending moment** |
| 2 | 26 | A simply supported beam of length 4 m has a central point load of 20 kN. What is the maximum shear force?<br>(a) 10 kN (b) 20 kN<br>(c) 40 kN (d) 80 kN<br>**Ans:10 kN** |
| 2 | 27 | A simply supported beam with a UDL load on entire span has zero shear force at:<br>(a) The supports (b) The mid-span<br>(c) One support (d) The quarter-span<br>**Ans:The mid-span** |
| 2 | 28 | In a simply supported beam with a UDL, the maximum bending moment is at the:<br>(a) Supports (b) Quarter-span<br>(c) Mid-span (d) One end<br>**Ans:Mid-span** |
| 2 | 29 | Which of the following is a determinate beam?<br>(a) Cantilever beam (b) Simply supported beam<br>(c) Overhanging beam (d) All of the above<br>**Ans:All of the above** |

**U.NO Q NO QUESTIONS**

3 1 Which of the following is an example of a doubly symmetrical shape?

(a) T-section (b) L-section

(c) I-section (d) Z-section

**Ans:I-section**

3 2 The point at which the entire weight of a body is assumed to be concentrated is called the:

(a) Centroid (b) Center of gravity

(c) Polar modulus (d) Radius of gyration

**Ans:Center of gravity**

3 3 The centroid of a square is located at:

(a) One of the corners (b) The midpoint of a side

(c) The intersection of its diagonals (d) The midpoint of an edge

**Ans:The intersection of its diagonals**

3 4 The moment of inertia about an axis perpendicular to the plane of the area is:

(a) Polar moment of inertia (b) Moment of inertia

(c) Radius of gyration (d) Section modulus

**Ans:Polar moment of inertia**

3 5 What is the ratio of the Moment of Inertia to the distance of the farthest fiber from the neutral axis?

(a) Radius of gyration (b) Section Modulus

(c) Polar Modulus (d) Polar moment of inertia

**Ans:Section Modulus**

3 6 The statement of the parallel axis theorem is used to find the moment of inertia about:

(a) A centroidal axis (b) A parallel axis

(c) A perpendicular axis (d) An axis passing through the corner

**Ans:A parallel axis**

3 7 The perpendicular axes theorem states that the moment of inertia about an axis perpendicular to a plane is equal to the **_____** of the moments of inertia about any two axes in the plane that are perpendicular to each other and intersect the first axis.

(a) average (b) square

(c) product (d) sum

**Ans:sum**

3 8 The moment of inertia of a solid circular section with diameter D is:

(a) πD^4/64 (b) πD^4/32

(c) πD^4/16 (d) πD^4/8

**Ans:πD^4/64**

3 9 A shape that does NOT have any axis of symmetry is:

(a) Symmetrical (b) Asymmetrical

(c) Anti-symmetrical (d) None of the above

**Ans:Asymmetrical**

| U.NO | Q NO | QUESTIONS | |
|---|---|---|---|
| 3 | 11 | For a rectangle with width 'b' and height 'd', the moment of inertia about its base 'b' is: | |
| | | (a) bd^3/12 | (b) b^3d/12 |
| | | (c) bd^3/3 | (d) b^3d/3 |
| | | **Ans:bd^3/3** | |
| 3 | 12 | For a rectangle with width 'b' and height 'd', the moment of inertia about its centroidal axis parallel to 'b' is: | |
| | | (a) bd^3/12 | (b) b^3d/12 |
| | | (c) bd^3/3 | (d) b^3d/3 |
| | | **Ans:bd^3/12** | |
| 3 | 13 | For a triangle with width 'b' and height 'h', the moment of inertia about its centroidal axis parallel to 'b' is: | |
| | | (a) bh^3/12 | (b) b^3h/12 |
| | | (c) bh^3/3 | (d) bh^3/36 |
| | | **Ans:bh^3/36** | |
| 3 | 14 | The section modulus of a hollow rectangular section is used to determine: | |
| | | (a) Torsional stress | (b) Shear stress |
| | | (c) Bending stress | (d) Normal stress |
| | | **Ans:Bending stress** | |
| 3 | 15 | The centroid of a square of side 'a' is at a distance of: | |
| | | (a) a/2 from both sides | (b) a from one side |
| | | (c) a/4 from the center | (d) a/2 from the top and bottom |
| | | **Ans:a/2 from both sides** | |
| 3 | 16 | The section modulus of a solid circular section with diameter 'D' is: | |
| | | (a) πD^3/32 | (b) πD^4/64 |
| | | (c) πD^3/64 | (d) πD^2/4 |
| | | **Ans:πD^3/32** | |
| 3 | 17 | What is the polar modulus of a solid circular section with diameter 'D'? | |
| | | (a) πD^3/16 | (b) πD^3/32 |
| | | (c) πD^4/32 | (d) πD^4/64 |
| | | **Ans:πD^3/16** | |
| 3 | 18 | What is the unit of Polar Moment of Inertia? | |
| | | (a) mm4 | (b) mm2 |
| | | (c) mm | (d) N/mm2 |
| | | **Ans:mm4** | |
| 3 | 19 | What is the unit of Moment of Inertia? | |
| | | (a) mm4 | (b) mm2 |
| | | (c) mm | (d) N/mm2 |
| | | **Ans:mm4** | |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 3 | 21 | What is the unit of Section Modulus?<br>(a) m3 (b) m4<br>(c) m2 (d) m<br>**Ans:m3** |
| 3 | 22 | The parallel axis theorem is given by:<br>(a) I=Ixx+Ah^2 (b) I=Ixx+Ah^3<br>(c) I=Ixx+Ah (d) I=Ixx−Ah<br>**Ans:I=Ixx+Ah^2** |
| 3 | 23 | The perpendicular axes theorem is given by:<br>(a) Izz=Ixx+Iyy (b) Izz=Ixx−Iyy<br>(c) Izz=Iyy−Ixx (d) Izz=Ixx+Iyy+Ah<br>**Ans:Izz=Ixx+Iyy** |
| 3 | 24 | The radius of gyration is related to Moment of Inertia by:<br>(a) k=sqrt(I/A) (b) k=I/A<br>(c) k=I·A (d) k=A/I<br>**Ans:k=sqrt(I/A)** |
| 3 | 25 | The centroid of a circular section with a diameter of 100 mm is located at a distance of:<br>(a) 25 mm from the edge (b) 50 mm from the edge<br>(c) 75 mm from the edge (d) 100 mm from the edge<br>**Ans:50 mm from the edge** |
| 3 | 26 | A rectangular section has a width of 100 mm and a height of 200 mm. What is the moment of inertia about the centroidal horizontal axis?<br>(a) 6.67×10^7 mm4 (b) 8.33×10^7 mm4<br>(c) 1.33×10^8 mm4 (d) 1.67×10^8 mm4<br>**Ans:8.33×10^7 mm4** |
| 3 | 27 | A solid circular section has a diameter of 40 mm. What is its moment of inertia?<br>(a) 12.57×10^4 mm4 (b) 12.57×10^3 mm4<br>(c) 12.57×10^2 mm4 (d) 12.57×10^1 mm4<br>**Ans:12.57×10^4 mm4** |
| 3 | 28 | The radius of gyration of a solid circular section with diameter 'D' is:<br>(a) D/4 (b) D/16<br>(c) D/2 (d) D/4<br>**Ans:D/4** |
| 3 | 29 | The radius of gyration of a solid circular section with diameter 100 mm is:<br>(a) 10 mm (b) 20 mm<br>(c) 25 mm (d) 50 mm<br>**Ans:25 mm** |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 4 | 1 | The bending stress on a beam is caused by:<br>(a) Axial force (b) Shear force<br>(c) Bending moment (d) Torsion<br>**Ans:Bending moment** |
| 4 | 2 | The longitudinal axis in a beam at which the bending stress is zero is called the:<br>(a) Shear axis (b) Torsional axis<br>(c) Neutral axis (d) Centroidal axis<br>**Ans:Neutral axis** |
| 4 | 3 | What is the assumption regarding the material of the beam in the theory of simple bending?<br>(a) It is anisotropic (b) It is homogeneous and isotropic<br>(c) It is brittle (d) It is composite<br>**Ans:It is homogeneous and isotropic** |
| 4 | 4 | The bending equation is given by:<br>(a) $M/I = E/R = \sigma/y$ (b) $M/y = E/I = \sigma/R$<br>(c) $I/M = E/R = y/\sigma$ (d) $I/y = E/R = \sigma/M$<br>**Ans:$M/I = E/R = \sigma/y$** |
| 4 | 5 | In the bending equation, I represents the:<br>(a) Moment of Inertia (b) Section Modulus<br>(c) Radius of gyration (d) Polar moment of inertia<br>**Ans:Moment of Inertia** |
| 4 | 6 | In a beam with a symmetrical cross-section, the neutral axis passes through the:<br>(a) Top fiber (b) Bottom fiber<br>(c) Centroid (d) Mid-point<br>**Ans:Centroid** |
| 4 | 7 | The product of the Young's Modulus (E) and the Moment of Inertia (I) is called:<br>(a) Stiffness (b) Flexural rigidity<br>(c) Section modulus (d) Bending moment<br>**Ans:Flexural rigidity** |
| 4 | 8 | What is the significance of the Section Modulus (Z)?<br>(a) It represents the flexural strength (b) It represents the stiffness of the beam<br>(c) It represents the moment of inertia (d) It represents the radius of gyration<br>**Ans:It represents the flexural strength** |
| 4 | 9 | What is the relationship between bending moment (M), bending stress (σ), and Section Modulus (Z)?<br>(a) $M=\sigma\times Z$ (b) $Z=M\times\sigma$<br>(c) $\sigma=Z\times M$ (d) $M=Z/\sigma$<br>**Ans:$M=\sigma\times Z$** |

| U.NO | Q NO | QUESTIONS | |
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| 4 | 11 | The bending stress is maximum at the: | |
| | | (a) Neutral axis | (b) Centroidal axis |
| | | (c) Topmost or bottommost fibers | (d) Quarter points |
| | | **Ans:Topmost or bottommost fibers** | |
| 4 | 12 | What is the unit of Flexural rigidity? | |
| | | (a) N·mm | (b) N/mm2 |
| | | (c) N·mm2 | (d) N·mm3 |
| | | **Ans:N·mm3** | |
| 4 | 13 | The section modulus is a measure of a beam's ability to resist: | |
| | | (a) Bending | (b) Torsion |
| | | (c) Shear | (d) Compression |
| | | **Ans:Bending** | |
| 4 | 14 | In a rectangular beam, the neutral axis is located at: | |
| | | (a) d/3 from the top fiber | (b) d/2 from the top or bottom fiber |
| | | (c) d/4 from the top fiber | (d) d from the top fiber |
| | | **Ans:d/2 from the top or bottom fiber** | |
| 4 | 15 | Bending stresses are: | |
| | | (a) Compressive stresses | (b) Tensile stresses |
| | | (c) Both tensile and compressive stresses | (d) Shear stresses |
| | | **Ans:Both tensile and compressive stresses** | |
| 4 | 16 | The neutral axis is a line of zero: | |
| | | (a) Shear force | (b) Bending moment |
| | | (c) Bending stress | (d) Shear stress |
| | | **Ans:Bending stress** | |
| 4 | 17 | What is the significance of a larger Section Modulus? | |
| | | (a) The beam is weaker in bending | (b) The beam can resist a larger bending moment |
| | | (c) The beam is more flexible | (d) The beam can carry more shear force |
| | | **Ans:The beam can resist a larger bending moment** | |
| 4 | 18 | Flexural rigidity is a measure of: | |
| | | (a) The resistance to bending deformation | (b) The resistance to axial deformation |
| | | (c) The resistance to twisting | (d) The resistance to shear deformation |
| | | **Ans:The resistance to bending deformation** | |
| 4 | 19 | The flexural rigidity (EI) of a beam with E=200 GPa and a rectangular cross-section of 100x200 mm is: | |
| | | (a) 1333.33×10^9 N·mm2 | (b) 133.33×10^7 N·mm2 |
| | | (c) 13.33×10^9 N·mm2 | (d) 1.33×10^7 N·m2 |
| | | **Ans:1.33×10^7 N·m2** | |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 4 | 21 | The ratio of moment of inertia to the maximum distance from the neutral axis is known as:<br>(a) Polar moment of inertia (b) Radius of gyration<br>(c) Section modulus (d) Flexural rigidity<br>**Ans:Section modulus** |
| 4 | 22 | In a simply supported beam with a central point load, the bending stress is maximum at:<br>(a) The supports (b) The point of application of load<br>(c) The neutral axis (d) The mid-span section<br>**Ans:The mid-span section** |
| 4 | 23 | The flexural rigidity is a measure of the beam's:<br>(a) Strength (b) Brittleness<br>(c) Stiffness (d) Ductility<br>**Ans:Stiffness** |
| 4 | 24 | The stiffness equation of a beam is a relationship between:<br>(a) Load and deflection (b) Load and bending moment<br>(c) Stress and strain (d) Moment of inertia and section modulus<br>**Ans:Load and deflection** |
| 4 | 25 | The maximum bending stress in a beam is given by:<br>(a) M×y/I (b) M/I×y<br>(c) M×I/y (d) I/(M×y)<br>**Ans:M×y/I** |
| 4 | 26 | If a beam's cross-section is symmetrical about the y-axis but not the x-axis, its neutral axis will be located at:<br>(a) The centroid (b) A point on the y-axis, but not the centroid<br>(c) The intersection of the y-axis and the top fiber (d) The intersection of the y-axis and the bottom fiber<br>**Ans:The centroid** |
| 4 | 27 | The bending stress is directly proportional to the distance from the:<br>(a) Centroidal axis (b) Neutral axis<br>(c) Both A and B (d) Top fiber<br>**Ans:Both A and B** |
| 4 | 28 | What is the bending stress at the neutral axis?<br>(a) Maximum (b) Minimum<br>(c) Zero (d) Negative<br>**Ans:Zero** |
| 4 | 29 | The flexural rigidity of a beam is a measure of its:<br>(a) Load-carrying capacity (b) Resistance to bending<br>(c) Resistance to shear (d) Resistance to torsion<br>**Ans:Resistance to bending** |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 5 | 1 | A structural member composed of slender elements carrying axial forces joined together at their ends is a:<br>(a) Frame (b) Truss<br>(c) Column (d) Beam<br>**Ans:Truss** |
| 5 | 2 | A joint that allows rotation but not translation is called a:<br>(a) Fixed joint (b) Rigid joint<br>(c) Pin joint (d) Welded joint<br>**Ans:Pin joint** |
| 5 | 3 | In a truss, the points where members are connected are called:<br>(a) Joints (b) Nodes<br>(c) Supports (d) Purlins<br>**Ans:Nodes** |
| 5 | 4 | What is the main purpose of a rafter in a truss?<br>(a) To support the roof covering (b) To resist tensile forces<br>(c) To resist compressive forces (d) To act as a diagonal member<br>**Ans:To support the roof covering** |
| 5 | 5 | A truss member that is subjected to tensile force is known as a:<br>(a) Strut (b) Tie<br>(c) Rafter (d) Slings<br>**Ans:Tie** |
| 5 | 6 | A truss member that is subjected to compressive force is known as a:<br>(a) Tie (b) Strut<br>(c) Rafter (d) Sling<br>**Ans:Strut** |
| 5 | 7 | A frame that cannot be analyzed using only the equations of static equilibrium is called a/an:<br>(a) Determinate frame (b) Indeterminate frame<br>(c) Perfect frame (d) Imperfect frame<br>**Ans:Indeterminate frame** |
| 5 | 8 | A frame for which the number of unknowns can be determined by the equations of static equilibrium is called a/an:<br>(a) Determinate frame (b) Indeterminate frame<br>(c) Deficient frame (d) Redundant frame<br>**Ans:Determinate frame** |
| 5 | 9 | The classification of frames includes:<br>(a) Perfect and imperfect (b) Determinate and indeterminate<br>(c) Both A and B (d) None of the above<br>**Ans:Both A and B** |

| U.NO | Q NO | QUESTIONS |
|---|---|---|
| 5 | 11 | The Method of Joints is based on the principle of:<br>(a) Moment equilibrium (b) Force equilibrium at each joint<br>(c) Work-energy principle (d) Virtual work<br>**Ans:Force equilibrium at each joint** |
| 5 | 12 | The Method of Sections is based on the principles of:<br>(a) Sum of H=0, sum V=0, sum M=0 (b) Sum of M=0 only<br>(c) Sum of H=0 and Sum of V=0 (d) None of the above<br>**Ans:Sum of H=0, sum V=0, sum M=0** |
| 5 | 13 | A perfect frame with 20 joints has how many members?<br>(a) 15 (b) 37<br>(c) 19 (d) 20<br>**Ans:37** |
| 5 | 14 | A simply supported truss with 8 joints and 13 members is:<br>(a) Perfect (b) Deficient<br>(c) Redundant (d) Indeterminate<br>**Ans:Perfect** |
| 5 | 15 | What is the main assumption of pin joints in truss analysis?<br>(a) They can transmit moments (b) They can transmit shear forces<br>(c) They can only transmit axial forces (d) They can only transmit compressive forces<br>**Ans:They can only transmit axial forces** |
| 5 | 16 | In the Method of Joints, what is the number of equilibrium equations at each joint?<br>(a) One (b) Two<br>(c) Three (d) Four<br>**Ans:Two** |
| 5 | 17 | What is the nature of a force in a bottom horizontal member of a simply supported truss with a central point load?<br>(a) Compression (b) Tension<br>(c) Both (d) Zero<br>**Ans:Tension** |
| 5 | 18 | A simply supported truss has a central point load. The horizontal members of the top chord are in:<br>(a) Tension (b) Compression<br>(c) Zero force (d) Cannot be determined<br>**Ans:Compression** |
| 5 | 19 | A cantilever truss has a vertical load at the free end. The top chord member is in:<br>(a) Tension (b) Compression<br>(c) Zero force (d) Cannot be determined<br>**Ans:Tension** |

| U.NO | Q NO | QUESTIONS |
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| 5 | 21 | What is the equation for a redundant frame?<br>(a) $m=2j-3$ (b) $m<2j-3$<br>(c) $m>2j-3$ (d) $m=3j-2$<br>**Ans:$m>2j-3$** |
| 5 | 22 | What is the equation for a deficient frame?<br>(a) $m=2j-3$ (b) $m<2j-3$<br>(c) $m>2j-3$ (d) $m=3j-2$<br>**Ans:$m<2j-3$** |
| 5 | 23 | A simply supported truss has 10 members and 6 joints. What is the nature of the truss?<br>(a) Perfect (b) Deficient<br>(c) Redundant (d) Instable<br>**Ans:Redundant** |
| 5 | 24 | In a simply supported truss, the bottom chord members are in:<br>(a) Tension (b) Compression<br>(c) Zero force (d) Shear<br>**Ans:Tension** |
| 5 | 25 | A cantilever truss with 6 members and 5 joints has a vertical load at the free end. The forces in the members can be found using:<br>(a) Method of sections (b) Method of joints<br>(c) Both A and B (d) Graphical method<br>**Ans:Method of joints** |
| 5 | 26 | What is the force in a diagonal member of a simply supported truss with a central point load?<br>(a) Compressive (b) Tensile<br>(c) Both (d) Zero<br>**Ans:Both** |
| 5 | 27 | A simply supported frame with 8 members and 5 joints is:<br>(a) Perfect (b) Deficient<br>(c) Redundant (d) Indeterminate<br>**Ans:Perfect** |
| 5 | 28 | In the Method of Joints, what is the order of analysis?<br>(a) Start at a joint with one unknown force (b) Start at a joint with two unknown forces<br>(c) Start at a joint with three unknown forces (d) Start at a joint with four unknown forces<br>**Ans:Start at a joint with two unknown forces** |
| 5 | 29 | The analysis of a truss assumes:<br>(a) Rigid joints (b) Pin joints<br>(c) Welded joints (d) Bolted joints<br>**Ans:Pin joints** |

| PART B/C | UNIT NO | Q.NO | QUESTION |
|---|---|---|---|
| B | 1 | 1 | An axial force of 2500 N is applied to a wire with a cross-sectional area of 5 mm2. What is the stress? |
| B | 1 | 2 | Define Poisson's ratio? |
| B | 1 | 3 | A soild cricket ball is immersed 5m in water. It is compressed on all sides by the pressure of water. Among Youngs modulus, Shear modulus and Bulk modulus which is appropriate to calculate its strain? |
| B | 1 | 4 | A bridge is beings assesed for its strength. The 25mm diameter (E=200GPa) main cable of a bridge is 30m long. When loaded with heavy traffic, it stretches by 2cm. Calculate the strain on the cable. |
| B | 1 | 5 | A concrete pillar in a building holds a load of 100,000 N and has an area of 0.05 m^2. If it shortens by 1.5 mm over its 2.5 mlength, calcuate its compressive stress. |
| B | 1 | 6 | The 25mm diameter main cable of a bridge is 30m long. When loaded with heavy traffic, it stretches by 2cm. Calculate the stress on the cable. Take E=200GPa. |
| B | 1 | 7 | Differentiate ductility and durability. |
| B | 1 | 8 | Give two differences between Youngs modulus and Shear modulus. |
| B | 1 | 9 | A steel cable has a tensile strength 250 MPa with a cross-sectional area of 5 mm2. What is the maximum tensile load it can carry? |
| B | 1 | 10 | A steel rod with a length of 1000 mm and a diameter of 10 mm is subjected to a tensile force. If the elongation is 0.5 mm, what is the longitudinal strain? |
| B | 1 | 11 | A rectangular plate of size 100mm x 50mm is subjected to a tensile force of 10 kN. What is the tensile stress? |
| B | 1 | 12 | A column has a width of 100 mm and a depth of 200 mm. The compressive force on it is 50 kN. What is the compressive stress? |
| B | 1 | 13 | A bar with an original diameter of 50 mm shrinks to 49.95 mm under a tensile load. What is the lateral strain? |
| B | 1 | 14 | A cubic block of material with a side length of 100 mm is subjected to a volumetric pressure. If its volume decreases by 100 mm3, what is the volumetric strain? |
| B | 1 | 15 | A steel rod has a longitudinal strain of 0.0012 and a lateral strain of 0.00036. What is the Poisson's Ratio? |
| C | 1 | 1 | A steel bar of length 2 m and diameter 20 mm is subjected to a tensile force of 50 kN. If Young's Modulus is 200 GPa, find the elongation. |
| C | 1 | 2 | A bar of length 3 m and cross-sectional area of 200 mm2 elongates by 0.5 mm under a tensile load of 30 kN. What is the Young's Modulus of the material? |
| C | 1 | 3 | A shear force of 10 kN is applied to a cubic block with a side length of 100 mm. If the shear modulus of the material is 80 GPa, what is the shear strain? |

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| C | 1 | 4 | A cube of 100 mm side length is subjected to a pressure of 100 MPa. If the bulk modulus of the material is 150 GPa, what is the change in its volume? |
| C | 1 | 5 | A metal bar with a length of 500 mm and a diameter of 20 mm is subjected to a tensile force. The elongation is 0.25 mm and the decrease in diameter is 0.0075 mm. What is the Poisson's Ratio of the material? |
| C | 1 | 6 | A material has a Young's Modulus of 100 GPa and a Poisson's Ratio of 0.25. Calculate the Shear Modulus. |
| C | 1 | 7 | A cylindrical concrete pillar with a cross-sectional area of 0.25 m2 supports a vertical load of 5000 kN. If the pillar is 5 m tall and the Young's Modulus is 25 GPa, find the total change in length. |
| C | 1 | 8 | A 10 m long steel cable with a diameter of 15 mm is used to lift a weight. The maximum allowable stress in the cable is 250 MPa. What is the maximum weight that can be lifted? |
| C | 1 | 9 | A block of material with a cross-sectional area of 1000 mm2 is subjected to a tensile force. The original length is 500 mm and the elongation is 0.5 mm. If the stress is 100 MPa, what is the force applied? |
| C | 1 | 10 | A cubic block with a side of 50 mm is subjected to a volumetric strain of 0.0002. If the Bulk Modulus of the material is 120 GPa, what is the volumetric stress? |
| B | 2 | 1 | What are the support reactions on a simplly supported beam of span 6m carrying a point load of 50 kN at 2m from left support? |
| B | 2 | 2 | What are the support reactions on a simplly supported beam carrying a UDL of 10 kN/m over a span of 5 m and a point load of of 50 kN at mid-span? |
| B | 2 | 3 | What are the support reactions on a simplly supported beam carrying a UDL of 50 kN/m over a span of 8 m? |
| B | 2 | 4 | What is the maximum shear force from a UDL of 10 kN/m over a span of 5 m? |
| B | 2 | 5 | A simply supported beam of length 6 m carries a central point load of 10 kN. What is the maximum shear force? |
| B | 2 | 6 | A cantilever beam of length 4 m is subjected to a UDL of 5 kN/m over its entire length. What is the shear force at the free end? |
| B | 2 | 7 | What is the maximum shear force for a cantilever beam of length 5 m with a UDL of 20 kN/m over its entire span? |
| B | 2 | 8 | Write the three static equilibrium equations. |
| B | 2 | 9 | Draw a simply supported beam with uniformly varying load. |
| B | 2 | 10 | A beam supports a 230 mm thick brick wall of uniform height throughout its span. What type of load does the brick wall given to the beam? |
| B | 2 | 11 | What is the maximum shear force for a cantilever beam of length 4.5 m with a UDL of 20 kN/m? |
| B | 2 | 12 | What is the maximum bending moment for a cantilever beam of length 3 m with a UDL of 10 kN/m? |

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| B | 2 | 13 | What is the maximum bending moment for a simply supported beam of length 8 m with a central point load of 16 kN? |
| B | 2 | 14 | What is the maximum bending moment for a simply supported beam of length 6 m with a UDL of 5 kN/m? |
| B | 2 | 15 | A simply supported beam of length 9 m carries two equal point loads of 15 kN at 3 m and 6 m from one end. The maximum bending moment is: |
| C | 2 | 1 | A cantilever beam of length 4m carries three concentrated loads of 10kN, 15kN, and 20kN at 1m, 2m, and 4m from the fixed end respectively. What is the maximum bending moment? |
| C | 2 | 2 | A simply supported beam of 6 m span cariies a UDL of 5 kN/m over its entire span. Draw the bending moment diagram. |
| C | 2 | 3 | A cantilever beam of length 8 m has a UDL of 2 kN/m for the first half of its length from the fixed end. What is the bending moment at the fixed end? |
| C | 2 | 4 | A cantilever beam of 6 m length carries a concentrated load of 20 kN at 4 m from the fixed end and a UDL of 5 kN/m over the entire span. Calculate the bending moment at the fixed end. |
| C | 2 | 5 | A cantilever beam of 5 m length is loaded with a UDL of 10 kN/m over its half-length from the fixed end. What is the maximum bending moment? |
| C | 2 | 6 | A simply supported beam of 5 m length has a UDL of 10 kN/m over its entire span. What is the bending moment at the midpoint? |
| C | 2 | 7 | A cantilever beam of 5 m length is subjected to a UDL of 10 kN/m. The bending moment at the fixed end is: |
| C | 2 | 8 | A cantilever beam of 6 m length carries a UDL of 10 kN/m. The bending moment at a section 2 m from the fixed end is: |
| C | 2 | 9 | A simply supported beam of 4 m length carries a central point load of 10 kN and a UDL of 5 kN/m over its entire span. What is the maximum bending moment? |
| C | 2 | 10 | A cantilever beam of length 6 m carries a UDL of 5 kN/m over the first 3 m from the fixed end. The maximum bending moment is: |
| B | 3 | 1 | A T-section and an I-section are fabricated with the same flange and web dimensions. Which of the two will have the higher moment of inertia, and why? |
| B | 3 | 2 | Give two examples in each of (i) symmetrical shapes (ii) unsymmetrical shapes. |
| B | 3 | 3 | Sketch a C section and Angle section and mark the positions of its centroids. |
| B | 3 | 4 | Write the perpendicular axis theorem. |
| B | 3 | 5 | Draw a symmetrical I-section and mark the position of its centroid. |
| B | 3 | 6 | Why are beams in buildings generally designed with a depth greater than their width? |
| B | 3 | 7 | Write the parallel axis theorem. |

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| B | 3 | 8 | The section modulus of a rectangular section with width 50 mm and height 100 mm is: |
| B | 3 | 9 | Draw a square section with side = 50 mm. Mark the position of its centroid. |
| B | 3 | 10 | Draw a rectangular section with width = 200 mm and height = 400 mm. Mark the position of its centroid. |
| B | 3 | 11 | Draw a triangular section with base = 100 mm and height = 100 mm. Mark the position of its centroid. |
| B | 3 | 12 | Calculate moment of inertial of circular section with a diameter of 50 mm about its centroidal axis |
| B | 3 | 13 | Calculate moment of inertial of square section with a side of 50 mm about its centroidal axis |
| B | 3 | 14 | The polar moment of inertia for a solid circular section with a diameter of 20 mm is: |
| B | 3 | 15 | A rectangular section of 100 mm x 200 mm has a radius of gyration about the horizontal centroidal axis of: |
| C | 3 | 1 | A T-section has a flange of 120x20 mm and a web of 20x150 mm. Find the centroid of the section from the bottom of the web. |
| C | 3 | 2 | A solid circular section has a diameter of 150 mm. Calculate the radius of gyration. |
| C | 3 | 3 | A solid rectangular section of 100 mm x 200 mm is placed such that its 100 mm side is vertical. Its moment of inertia about the centroidal horizontal axis is: |
| C | 3 | 4 | A solid circular section has a diameter of 200 mm. Find its section modulus. |
| C | 3 | 5 | A soild circular section has diameter 120 mm. Find its polar moment of inertia. |
| C | 3 | 6 | A solid rectangular section of 100 mm x 200 mm is placed with the 200 mm side vertical. What is the section modulus about the horizontal centroidal axis? |
| C | 3 | 7 | A T-section with a flange of 150x20 mm and a web of 20x100 mm has a centroid at 40.5 mm from the bottom of the web. Total height of the section is 120 mm. Find the moment of inertia about the horizontal centroidal axis. |
| C | 3 | 8 | An doubly symmetric I-section with flanges of 100x10 mm, a web of 10x150 mm. Total height of the section is 170mm. Find the moment of inertia about the horizontal centroidal axis. |
| C | 3 | 9 | A solid circular section has a diameter of 200 mm. Find its section modulus. |
| C | 3 | 10 | A square section has a side of 80 mm. Find its radius of gyration. |
| B | 4 | 1 | Sketch a rectangular section with width = 200 mm and height = 400 mm. Mark the position of neutral axis. |
| B | 4 | 2 | Sketch a circular section with diameter = 500 mm and mark the position of neutral axis. |
| B | 4 | 3 | Sketch the variation of bending stress along the depth of a beam. |

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| B | 4 | 4 | Give the relation between radius of curvature and bending stress. |
| B | 4 | 5 | Give the relation between section modulus and moment of resistance of a beam |
| B | 4 | 6 | What are the assumptions in the theory of simple bending |
| B | 4 | 7 | A beam with flexural rigidity EI = 5000 $kNm^2$ is subjected to a bending moment of 20 kNm. Find the radius of curvature. |
| B | 4 | 8 | If the allowable bending stress for a beam is 150 MPa and the section modulus is 50,000 $mm^3$, find the moment of resistance. |
| B | 4 | 9 | A recangular cross section is subjected to bending. To increase its bending strength among breadth and depth which shall be increased to effectively increase its bending stregth. |
| B | 4 | 10 | A hollow rectangular beam section has a section modulus of 350,000mm^3 . During a test, a bending stress of 120 $N/mm^2$ is measured on its outer fiber. Calculate the bending moment acting on the beam at that instant. |
| B | 4 | 11 | A beam with a rectangular cross-section is subjected to bending. To most effectively increase its bending strength, should the breadth or the depth of the section be increased? |
| B | 4 | 12 | Write the simple bending equation. |
| B | 4 | 13 | A simply supported beam of 5m span carries a point load of 80 kN at 2m from the left support. The beam will have maximum bending stress at? |
| B | 4 | 14 | A simply supported beam is subjected to a central point load. At which location(s) will the maximum bending stress occur? |
| B | 4 | 15 | A cantilever beam is subjected to a UDL on entire span. At which location(s) will the maximum bending stress occur? |
| C | 4 | 1 | A simply supported beam with a UDL of 10 kN/m over a 6 m span has a rectangular cross-section of 100 mm x 200 mm. What is the maximum bending moment and maximum bending stress? |
| C | 4 | 2 | A simply supported beam of 4 m span is subjected to a UDL of 12 kN/m. The cross-section is a rectangle with a width of 100 mm. If the maximum bending stress is 25 MPa, what is the required depth of the beam? |
| C | 4 | 3 | A simply supported beam of 8 m length has two equal point loads of 15 kN at 2 m from each support. If the beam has a rectangular section of 120 mm wide, and the maximum allowable bending stress is 10 MPa, what is the minimum required depth? |
| C | 4 | 4 | A simply supported beam of 10 m length has a central point load of 50 kN. If the beam has a solid square cross-section, and the maximum allowable bending stress is 100 MPa, what is the required side length of the square? |
| C | 4 | 5 | A simply supported beam of 8 m span is loaded with a UDL of 10 kN/m and a central point load of 40 kN. If the maximum bending stress is 15 MPa, what is the required section modulus? |
| C | 4 | 6 | A simply supported beam of 6 m span has a central point load of 20 kN. The beam has a rectangular cross-section with a width of 150 |

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| | | | mm. If the maximum bending stress is 10 MPa, what is the minimum required depth? |
| C | 4 | 7 | A simply supported beam of size 150 mm x 200 mm and 3 m span is loaded with uniformly distributed load(UDL). The allowable bending stress 10 MPa. Calculate the magnitude of maximum UDL allowed on the beam. |
| C | 4 | 8 | A simply supported beam of size 100 mm x 300 mm and 5 m span is loaded with central point load. The allowable bending stress 5 MPa. Calculate the magnitude of maximum load allowed on the beam. |
| C | 4 | 9 | A simply supported beam of 10 m span is subjected to a UDL of 10 kN/m. If the beam has a rectangular cross-section of 150 mm x 300 mm, what is the maximum bending stress? |
| C | 4 | 10 | A rectangular beam of 100 mm x 200 mm is subjected to a bending moment of 15 kNm. The Young's Modulus is 200 GPa. Find the radius of curvature. |
| B | 5 | 1 | What are 'Nodes' in a truss? |
| B | 5 | 2 | Differentiate between a determinate and an indeterminate frame. |
| B | 5 | 3 | What is the key difference between a perfect and an imperfect frame? |
| B | 5 | 4 | Are imperfect frame used in practice? Give reason |
| B | 5 | 5 | In the Method of Joints, what set of equations is applied at each pin joint? |
| B | 5 | 6 | When analyzing a cantilever truss by joints, from which end should you typically start, and why? |
| B | 5 | 7 | In a symmetrical, simply supported truss with symmetrical loading, what can be said about the forces in symmetrical members? |
| B | 5 | 8 | Write the mathematical formula used to check if a plane truss is perfect. |
| B | 5 | 9 | A truss has 10 members and 6 joints. Is it perfect, deficient, or redundant? |
| B | 5 | 10 | What is the main advantage of the Method of Sections over the Method of Joints? |
| B | 5 | 11 | Sketch any unstable simply supported truss with 8 members |
| B | 5 | 12 | Sketch any indeterminate simply supported truss with 11 members |
| B | 5 | 13 | Sketch any determinate simply supported truss with 9 members |
| B | 5 | 14 | Give two differences between beam and truss. |
| B | 5 | 15 | In a truss with vertical loads only, are the support reactions also vertical? Give reason |
| C | 5 | 1 | A perfect truss is specified as follows: Pin at A(0,0), roller at E(8,0), joints B(0,4), C(4,4), D(8,4), F(4,0). The dimensions are in meters. The members are AB, BC, CD, DE, EF, AF, AC, CE and CF. The |

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| | | | truss is loaded with 100 kN downward at C. Find the magnitude and nature of forces in the member AC. |
| C | 5 | 2 | A cantilever truss specifications are as follows: supported at A(0,0) and supported joint B(4,0), free joint C(4,3). The dimensions are in meters.The members are AB, BC, AC. The truss is loaded with 8 kN downward at C. Find force in all members. |
| C | 5 | 3 | Bridge truss specifications are as follows: Hinge at A(0,0), roller at D(8,0), joint B(2,3), joint C(6,3). The dimensions are in meters. The members are AB, BC, CD, AD, AC. The truss is loaded with 20 kN downward at B. Find the magnitude and nature of force in the member AC. |
| C | 5 | 4 | A perfect truss is specified as follows:. Pin at A(0,0), roller at F(12,0), top joints B(3,4), C(6,4), D(9,4), bottom joint E(6,0). The members are AB, BC, CD, DF, EF, AE, BE, CE and DE. The truss is loaded with 25 kN downward at C. Find the magnitude and nature of forces in the member CE. |
| C | 5 | 5 | A perfect truss is specified as follows:. Pin at A(0,0), roller at F(12,0), top joints B(3,4), C(6,4), D(9,4), bottom joint E(6,0). The members are AB, BC, CD, DF, EF, AE, BE, CE and DE. The truss is loaded with 50 kN downward at C. Find the magnitude and nature of forces in the member EF. |
| C | 5 | 6 | A perfect truss is specified as follows: Pin at A(0,0), roller at D(4,0), joints B(0,4), C(4,4). The dimensions are in meters. The members are AB, BC, CD, AD, AC. The truss is loaded with 20 kN downward at C. Find the magnitude and nature of force in the member AC. |
| C | 5 | 7 | A perfect truss is specified as follows: Pin at A(0,0), roller at E(8,0), joints B(0,3), C(4,5), D(8,3). The dimensions are in meters. The members are AB, BC, CD, DE, AE, AC, CE. The truss is loaded with 18 kN downward at C. Find the magnitude and nature of forces in the members AB and BC. |
| C | 5 | 8 | A roof truss is made as follows: Pin at A(0,0), roller at G(14,0), top joints B(2,4), C(5,6), D(9,6), E(12,4), bottom joint F(7,0). The dimensions are in meters. The members are AB, BC, CD, DE, EG, FG, AF,EF, BF, CF, DF. Loads: 20 kN downward at A, B, C, D, E and G. Find the magnitude and nature of force in the member AF. |
| C | 5 | 9 | A perfect truss is specified as follows: Pin at A(0,0), roller at E(8,0), joints B(0,4), C(4,4), D(8,4), F(4,0). The dimensions are in meters. The members are AB, BC, CD, DE, EF, AF, AC, CE and CF. The truss is loaded with 100 kN downward at F. Find the magnitude and nature of forces in the member CF. |
| C | 5 | 10 | A perfect truss is specified as follows:. Pin at A(0,0), roller at F(12,0), top joints B(3,4), C(6,4), D(9,4), bottom joint E(6,0). The members are AB, BC, CD, DF, EF, AE, BE, CE and DE. The truss is loaded with 200 kN downward at E. Find the magnitude and nature of forces in the member AB. |