

- Q.20 Write the assumptions made in the theory of simple bending.
- Q.21 Describe the terms slope and deflection in a simply supported beam having length = L m and point load = P kN, at centre of the beam.
- Q.22 Write the different end conditions of a loaded column along with their diagrams.

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

- Q.23 Draw the SFD and BMD for a simply supported beam of span 8.5m carries a uniformly distributed load of 7.5kN/m over the whole span and also two point loads of 11kN and 20kN at points of 4.5m and 6.5m respectively from the left hand support.
- Q.24 A simply supported beam of length 3.5 m is subjected to a central point load of 9.5 KN. Find the maximum slope and deflection of the beam. Assume $E = 200 \text{ KN/mm}^2$ and $I = 10 \times 10^6 \text{ mm}^4$
- Q.25 A truss ABC has a span of $BC = 5.5 \text{ m}$, $\angle ABC = 30^\circ$ and $\angle ACB = 60^\circ$. It carries a load of 10.5 KN at its apex. Find the forces in the members AB, AC and BC.

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3rd Sem / Civil, Highway Engg.

Subject : Structural Mechanics

Time : 3 Hrs.

M.M. : 60

SECTION-A

Note: Multiple choice questions. All questions are compulsory (6x1=6)

- Q.1 The property of material by which it can be drawn to a smaller section by applying a tensile load is called _____
 a) Elasticity b) Plasticity
 c) Ductility d) Malleability
- Q.2 The point of contra-flexure occur in case of _____
 a) Cantilever beams
 b) Overhanging beams
 c) Simply supported beams
 d) All types of beams
- Q.3 The moment of inertia of an area is always least with respect to _____
 a) Radius of gyration b) Bottom most axis
 c) Vertical axis d) Centroid axis

- Q.4 Bending stresses are due to _____
 a) Thrust b) Bending moment
 c) Shear force d) all of above
- Q.5 A column that fails due to direct stress, is called _____
 a) Long column b) Short column
 c) Weak column d) Medium Column
- Q.6 In a perfect frame, the relation between number of joints 'j' and number of members 'n' is _____
 a) $n=2j$ b) $n=2j+3$
 c) $n=2j-3$ d) None of these

SECTION-B

Note: Objective/ Completion type questions. All questions are compulsory. (6x1=6)

- Q.7 The bending moment at the fixed end of a cantilever beam is _____ (Minimum / Maximum)
- Q.8 Moment of inertia of a section is minimum about an axis passing through its _____ (Top axis / Centroid)
- Q.9 The shear stress at the N.A is _____ (Maximum / Minimum)
- Q.10 Slope is the angle in radians, which the tangent at the section of beam makes with the _____ (Horizontal / vertical)
- Q.11 The strength of the column depends upon the _____ and its end conditions. (Slenderness ratio / Effective span)

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- Q.12 The basic perfect frame is a _____ (Rectangle / Triangle)

SECTION-C

Note: Short answer type questions. Attempt any eight questions out of ten questions. (8x4=32)

- Q.13 Name the different tests for metals and describe any one of them in detail.
- Q.14 A bar 300mm long is 40 mm X 40 mm in section for 110 mm of its length, 20 mm diameter for 80 mm length and 50 mm diameter for the remaining length. If the tensile force of 125 KN is applied to the bar, calculate the stresses induced in the different sections and total elongations of the bar. Take $E=2 \times 10^5 \text{ N/mm}^2$
- Q.15 Write a short note on “Temperature stresses and temperature strains for rigid supports” in steel.
- Q.16 Describe the following terms:
 a) Hook’s Law b) Bending moment
- Q.17 Describe the various types of beams with the help of diagrams.
- Q.18 Find the moment of inertia of T-section having the flange size 20 cm x 5 cm and web size 5 cm x 20 cm, about X - X axis and Y - Y axis passing through the centroid of the section.
- Q.19 Find the moment of inertia of a circular section of 20 mm diameter through its centre of gravity.

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