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3rd Sem / Civil Engineering

Subject : Structural Mechanics

Time : 3 Hrs. M.M. : 60

SECTION-A

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

Q.1 The ability of a material to deform without breaking is called_____.

a) Plasticity b) Elasticity
c) Creep d) None of these

Q.2 At the point of contra-flexure _____.

a) B.M is minimum
b) B.M is maximum
c) B.M is either zero or changes sign
d) None of these

Q.3 The unit of moment of inertia is_____.

a) L b) L2
c) L3 d) L4

Q.4 Bending stresses are also known as _____.

a) Shear stress
b) Temperature stresses
c) Longitudinal stresses
d) Hoop stresses

Q.5 The Euler's formula holds good only for_____.

a) Long column b) Short column
c) Medium column d) Weak column

Q.6 If n >(2j-3), then the frame will be_____.

a) Perfect frame b) Deficient frame
c) Redundant frame d) None of these

SECTION-B

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

Q.7 Point of contra-flexure is also known as point of_____(Moment/Inflexion)

Q.8 If a section is symmetrical about X-X or Y-Y axis, then the centroid of the section will lie on _____ (Axis of symmetry/ Edge of plane)

Q.9 The shear stress at the_____ is maximum. (Top axis / Neutral axis)

Q.10 In a cantilever beam, the maximum deflection occurs at _____.

Q.11 _____ is the ratio between the equivalent length of the column to the minimum radius of gyration. (Buckling factor/ factor of safety)

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 Write the various classifications of materials and describe any one of them in detail.

Q.14 Draw and describe the main features of stress-strain diagram for HYSD steel.

Q.15 A bar 300 mm long is 50 mm X 50 mm in section for 125 mm of its length, 25 m diameter for 75 mm length and 40 mm diameter for the remaining length. If the tensile force of 80 KN is applied to the bar, calculate the stresses induced in the different sections and total elongations of the bar. Take E=2 x 10^5 N/mm^2

Q.16 Describe the following terms:

a) Modulus of elasticity b) Shear force

Q.17 Describe the various types of supports used for transfer of load from the beams to the vertical structural members with the help of diagram.

Q.18 Fine the moment of inertia of a rectangular section 60 mm wide and 40 mm deep about its centre of gravity

Q.19 Find the moment of inertia of T-section having the flange size 15 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.20 Write the assumptions made in the theory of simple banding.

Q.21 A simply supported beam of length 4 m carries a uniformly distributed load of 8KN/m over the entire span. Calculate the maximum slope and deflection of the beam. Assume EI-80 X 10^9 Nmm^2 for the beam.

Q.22 A mild steel tube 25 mm external diameter, 3 mm thick and 3.5 m long is used as a strut. Determine the safe compressive load which this strut can carry when both of its ends are hinged. Take E = 2 X 10^5 N/mm^2 and F.O.S. = 3

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 5 m carries a UDL of 2.25 kN/m for a length of 2m starting from a point at a distance of 1.5 m from the left hand support.

Q.24 a) Find the moment of inertia about the centroidal Y-Y axis of an inverted L-section 15 cm x 10 cm x 2.5 cm.

b) Describe the terms slope and deflection in a simply supported beam having length = L m and uniformly distributed load = P kN/m, over the whole span

Q.25 A truss ABC has a span of BC = 5 m, $\angle$ ABC = 60^o and $\angle$ ACB = 30^o. It carries a load of 9.5 KN at its apex. Find the forces in the members AB, AC and BC.