

Fully Solved
Multiple Choice Questions

For

IES

GATE

PSUs



**CIVIL
ENGINEERING**

3200

Fully Solved
Multiple Choice Questions

by

B. Singh (Ex. IES)

CMD, MADE EASY Group



MADE EASY
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PREFACE



It gives me great happiness to introduce this book on Civil Engineering containing nearly **3200 fully solved multiple choice questions**. Though every candidate has ability to succeed but competitive environment, quality guidance and good source & references for study certainly give competitive edge.

Year by year number of competitors are increasing and the variety of questions asked in examination is widening, under such scenario this book will definitely help students to enhance their skills required to succeed in competitive exams like IES, GATE, PSUs, State Engineering Services etc.

While preparing this book utmost care has been taken to cover all the chapters and variety of concepts which may be asked in the exams. The solutions and answers provided are upto the closest possible accuracy. The full efforts have been made by MADE EASY Team to provide error free solutions and explanations.

I must express my thanks to Mr. Prashant Agarwal (IES) who has contributed to bring this book on time.

I have true desire to serve student community by way of providing good sources of study and quality guidance. I hope this book will be proved an important tool to succeed in competitive examinations. Any suggestions from the readers for the improvement of this book are most welcome.

B. Singh (Ex. IES)

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Strength of Materials

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Chapter 1

Properties of Metals, Simple Stress-Strain and Elastic Constants

- Q.1** A material has identical properties in all directions, it is said to be
(a) homogeneous (b) isotropic
(c) elastic (d) orthotropic
- Q.2** The term nominal stress in stress-strain curve for mild steel implies
(a) average stress
(b) actual stress
(c) yield stress
(d) stress at necking
- Q.3** For metallic minerals creep becomes an important consideration at
(a) 500°C
(b) 550°C
(c) half of the melting point temperature on absolute scale
(d) any temperature
- Q.4** Clapeyron's theorem is associated with the analysis of
(a) simply supported beams
(b) fixed beams
(c) continuous beams
(d) cantilever beams
- Q.5** A rubber band is elongated to double its initial length, its true strain is
(a) 0.500 (b) 0.693
(c) 1.00 (d) 1.386
- Q.6** A prismatic beam has uniform
(a) depth (b) width
(c) strength (d) cross-section
- Q.7** In the case of pure bending, the beam will bend into an arc of a
(a) circle (b) parabola
(c) ellipse (d) hyperbola
- Q.8** If the modulus of elasticity is zero, the material is said to be
(a) rigid (b) elastic
(c) flexible (d) plastic
- Q.9** The compressibility of a material is proportional to
(a) Poisson's ratio μ
(b) modulus of elasticity (E)
(c) reciprocal of E
(d) reciprocal of μ
- Q.10** If a beam with the rectangular cross-section is obtained by cutting from circular log of timber, then for the beam to have strongest section in bending, the ratio of breadth to depth should be
(a) 0.500 (b) 0.707
(c) 0.717 (d) 0.786
- Q.11** According to St. Venant's principle
(a) Deformations of all materials for a given loading are equal
(b) It is a method of determining stress conditions at the end of the plates
(c) Stress conditions approach uniformly as the distance from the point of applications of the load increase
(d) After a point of time the stresses in a loaded member tend to relieve

- Q.12** Notched bar tests are frequently used for testing the
 (a) impact strength of a material
 (b) hardness of a material
 (c) machinability of a metal
 (d) corrosion resistance of the material
- Q.13** In the creep test, the following type of stress is applied to the specimen
 (a) uniaxial compression
 (b) uniaxial tension
 (c) biaxial compression or tension
 (d) alternating stress
- Q.14** A free bar of length l is uniformly heated from 0°C to a temperature $t^\circ\text{C}$, α is the coefficient of linear expansion and E is the modulus of elasticity. The stress in the bar is
 (a) $\alpha t E$ (b) $\alpha t E/2$
 (c) zero (d) None of these
- Q.15** A test specimen is stressed slightly beyond the yield point and then unloaded. Its yield strength
 (a) decreases
 (b) increases
 (c) remains same
 (d) becomes equal to ultimate tensile strength
- Q.16** Cup-and-cone type fracture occurs in the case of
 (a) cast iron
 (b) round specimen of ductile metals
 (c) tough steel
 (d) soft brass
- Q.17** Materials having elongation less than 5% are considered brittle. In such cases, factor of safety is based on
 (a) yield stress
 (b) endurance limit
 (c) limit of proportionality
 (d) ultimate stress
- Q.18** A rod of length ' l ' and cross-sectional area ' A ' rotates about an axis passing through one end of the rod. The extension produced in the rod due to centrifugal forces is (w is the weight of the rod per unit length and ω is the angular velocity of rotation of the rod)
 (a) $\omega w l^2 g E$ (b) $\omega^2 w l^3 / 3 g E$
 (c) $\omega^2 w l^3 / g E$ (d) $3 g E / \omega^2 W l^3$
- Q.19** Young's modulus of elasticity and Poisson's ratio of a material are 1.25×10^5 MPa and 0.34 respectively. The modulus of rigidity of the material is
 (a) 0.4025×10^5 MPa
 (b) 0.4664×10^5 MPa
 (c) 0.8375×10^5 MPa
 (d) 0.9469×10^5 MPa
- Q.20** In a homogeneous, isotropic elastic material, the modulus of elasticity E in terms of G and K is equal to
 (a) $(G + 3K)/9KG$ (b) $(3G + K)/9KG$
 (c) $9KG/(G + 3K)$ (d) $9KG/(K + 3G)$
- Q.21** The unit of elastic modulus is the same as those of
 (a) stress, shear modulus and pressure
 (b) strain, shear modulus and force
 (c) shear modulus, stress and force
 (d) stress, strain and pressure
- Q.22** For a linearly elastic, isotropic and homogeneous material, the number of elastic constants required to relate stress and strain is
 (a) two (b) three
 (c) four (d) six
- Q.23** If the cross-section of a member is subjected to a uniform shear stress of intensity ' q ', then the strain energy stored per unit volume is equal to (G = modulus of rigidity)
 (a) $2q^2/G$ (b) $2G/q^2$
 (c) $q^2/2G$ (d) $G/2q^2$
- Q.24** In the case of an engineering material under unidirectional stress in the x -axis, the Poisson's ratio is equal to (symbols have their usual meanings)
 (a) ϵ_y/ϵ_x (b) ϵ_y/σ_x
 (c) ϵ_y/σ_s (d) σ_y/ϵ_x

- Q.25** A 100 mm long and 50 mm diameter steel rod fits snugly between two rigid walls 100 mm apart at room temperature. Young's modulus of elasticity and coefficient of linear expansion of steel are $2 \times 10^5 \text{ N/mm}^2$ and $12 \times 10^{-6}/^\circ\text{C}$ respectively. The stress developed in the rod due to a 100°C rise in temperature will be
 (a) $6 \times 10^{-11} \text{ N/mm}^2$ (b) $6 \times 10^{-10} \text{ N/mm}^2$
 (c) 240 N/mm^2 (d) 2400 N/mm^2
- Q.26** During tensile testing of a specimen using a Universal Testing Machine, the parameters actually measured include
 (a) true stress and true strain
 (b) Poisson's ratio and Young's modulus
 (c) engineering stress and engineering strain
 (d) load and deflection
- Q.27** If the value of Poisson's ratio is zero, then it means that
 (a) the material is rigid
 (b) the material is perfectly plastic
 (c) there is no longitudinal strain in the material
 (d) the longitudinal strain in the material is infinite
- Q.28** The stretch in a steel rod of circular section, having a length l subjected to a tensile load P and tapering uniformly from a diameter d_1 , at one end to a diameter d_2 at the other end, is given by
 (a) $P/4Ed_1d_2$ (b) $P/\pi Ed_1d_2$
 (c) $P/4E(d_1 - d_2)$ (d) $4P/\pi Ed_1d_2$
- Q.29** If Poisson's ratio for a material is 0.5, then the elastic modulus for the material is
 (a) three times its shear modulus
 (b) four times its shear modulus
 (c) equal to its shear modulus
 (d) indeterminate
- Q.30** The Poisson's ratio of a material which has Young's modulus of 120 GPa, and shear modulus of 50 GPa, is
 (a) 0.1 (b) 0.2
 (c) 0.3 (d) 0.4
- Q.31** A rod of material $E = 200 \times 10^3 \text{ MPa}$ and $\alpha = 10^{-3} \text{ mm/mm}/^\circ\text{C}$ is fixed at both the ends. It is uniformly heated such that the increase in temperature is 30°C . The stress developed in the rod is
 (a) 6000 N/mm^2 (tensile)
 (b) 6000 N/mm^2 (compressive)
 (c) 2000 N/mm^2 (tensile)
 (d) 2000 N/mm^2 (compressive)
- Q.32** The deformation of a bar under its own weight as compared to that when subjected to a direct axial load equal to its own weight will be
 (a) the same (b) one-fourth
 (c) half (d) double
- Q.33** The number of independent elastic constants required to express the stress-strain relationship for linearly elastic isotropic material is
 (a) one (b) two
 (c) three (d) four
- Q.34** A tapering bar (diameters of end sections being d_1 and d_2) and a bar of uniform cross-section 'd' have the same length and are subjected to the same axial pull. Both the bars will have the same extension if 'd' is equal to
 (a) $(d_1 + d_2)/2$ (b) $\sqrt{d_1d_2}$
 (c) $\sqrt{d_1d_2}/2$ (d) $\sqrt{(d_1 + d_2)/2}$
- Q.35** The number of elastic constants for a completely anisotropic elastic material which follows Hooke's law is
 (a) 2 (b) 4
 (c) 21 (d) 25
- Q.36** For a given material, the modulus of rigidity is 100 GPa and Poisson's ratio is 0.25. The value of modulus of elasticity in GPa is
 (a) 125 (b) 150
 (c) 200 (d) 250