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# 500+ TOP Strength of Materials MCQ Questions and Answers

## **Strength of Materials Multiple choice Questions**

**1. A material obeys hook's law up to**

- (A) Plastic limit
- (B) Elastic limit
- (C) Yield point
- (D) Limit of proportionality

**Answer: B**

**2. The torque transmitted by a solid shaft of diameter (D) is (where  $\tau$  = Maximum allowable shear stress)**

- (A)  $\pi /4 \times \tau \times D^3$
- (B)  $\pi /16 \times \tau \times D^3$
- (C)  $\pi /32 \times \tau \times D^3$
- (D)  $\pi /64 \times \tau \times D^3$

**Answer: B**

**3. The torque transmitted by a hollow shaft of outer diameter ( $d_1$ ) and inner diameter ( $d_2$ ) is (where,  $\tau$  = Maximum allowable shear stress)**

- (A)  $\pi /4 \times \tau \times (d_1^4 - d_2^4)/ d_1$
- (B)  $\pi /16 \times \tau \times (d_1^4 - d_2^4)/ d_1$
- (C)  $\pi /32 \times \tau \times (d_1^4 - d_2^4)/ d_1$
- (D)  $\pi /64 \times \tau \times (d_1^4 - d_2^4)/ d_1$

**Answer: B**

**4. If  $T_h$  is the torque resisting capacity of a hollow shaft and  $T_s$  is that of a solid shaft, of the same material, length and weight. Then,**

- (A)  $T_h > T_s$
- (B)  $T_h < T_s$
- (C)  $T_h = T_s$
- (D) None of these

**Answer: A**

**5. A cube subjected to three mutually perpendicular stress of equal intensity  $p$  expenses a volumetric strain**

- (A)  $3p/ E \times (2/m - 1)$
- (B)  $3p/ E \times (2 - m)$
- (C)  $3p/ E \times (1 - 2/m)$

(D)  $E/ 3p \times (2/m - 1)$

**Answer: C**

**6. The strain energy stored in a solid circular shaft subjected to shear stress ( $\tau$ ), is:**  
**(Where, G = Modulus of rigidity for the shaft material)**

(A)  $\tau^2/ 2G \times \text{Volume of shaft}$

(B)  $\tau/ 2G \times \text{Volume of shaft}$

(C)  $\tau^2/ 4G \times \text{Volume of shaft}$

(D)  $\tau/ 4G \times \text{Volume of shaft}$

**Answer: A**

**7. The strain energy stored in a solid circular shaft in torsion, subjected to shear stress ( $\tau$ ), is:**  
**(Where, G = Modulus of rigidity for the shaft material)**

(A)  $\tau^2/ 2G \times \text{Volume of shaft}$

(B)  $\tau/ 2G \times \text{Volume of shaft}$

(C)  $\tau^2/ 4G \times \text{Volume of shaft}$

(D)  $\tau/ 4G \times \text{Volume of shaft}$

**Answer: C**

**8. The stress induced in a body, when suddenly loaded, is \_\_\_\_\_ the stress induced when the same load is applied gradually.**

(A) Equal to

- (B) One-half
- (C) Twice
- (D) Four times

**Answer: C**

**9. If  $K_h$  is the torque resisting capacity of a hollow shaft and  $K_s$  is that of a solid shaft, of the same material, length and weight. Then,**

- (A)  $K_h > K_s$
- (B)  $K_h < K_s$
- (C)  $K_h = K_s$
- (D) None of these

**Answer: A**

**10. After reaching the yielding stage while testing a mild steel specimen, strain**

- (A) Becomes constant
- (B) Starts decreasing
- (C) Increases without any increase in load
- (D) None of the above

**Answer: C**



## STRENGTH of Materials

### Multiple Choice Questions

### STRENGTH of Materials Multiple Choice Questions

#### **11. Principal planes are planes having**

- (A) Maximum shear stress
- (B) No shear stress
- (C) Minimum shear stress
- (D) None of the above

#### **Answer: B**

#### **12. If the slenderness ratio for a column is 100, then it is said to be a \_\_\_\_\_ column.**

- (A) Long
- (B) Medium
- (C) Short
- (D) None of these

#### **Answer: A**

**13. A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The maximum normal stress will be**

- (A) 400 MPa
- (B) 500 MPa
- (C) 900 MPa
- (D) 1400 MPa

**Answer: D**

**14. Young's modulus of a wire is defined as the stress which will increase the length of wire compared to its original length by**

- (A) Half
- (B) Same amount
- (C) Double
- (D) One-fourth

**Answer: B**

**15. True stress strain-curve for materials is plotted between**

- (A) Load/original cross-sectional area and change in length/original length
- (B) Load/ instantaneous cross-sectional area and loge (original area/instantaneous area)

(C) Load/ instantaneous cross-sectional area and change in length/original length

(D) Load/ instantaneous area and instantaneous area/original area

**Answer: B**

**16. A hollow shaft of same cross-section area as compared to a solid shaft transmit**

(A) Same torque

(B) Less torque

(C) More torque

(D) Unpredictable

**Answer: C**

**17. A steel bar of 5 mm is heated from  $25^{\circ}\text{C}$  to  $45^{\circ}\text{C}$  and it is free to expand. The bar will induce**

(A) No stress

(B) Shear stress

(C) Tensile stress

(D) Compressive stress

**Answer: A**

**18. Two shafts 'A' and 'B' transmit the same power. The speed of shaft 'A' is 250 r.p.m. and that of shaft 'B' is 300 r.p.m.**

(A) The shaft 'B' has the greater diameter

(B) The shaft 'A' has the greater diameter

(C) Both are of same diameter

(D) None of these

**Answer: B**

**19. The intensity of stress which causes unit strain is called**

(A) Unit mass

(B) Modulus of rigidity

(C) Bulk modulus

(D) Modulus of Elasticity

**Answer: D**

**20. A thick cylindrical shell having  $r_o$  and  $r_i$  as outer and inner radii, is subjected to an internal pressure ( $p$ ). The maximum tangential stress at the inner surface of the shell is**

(A)  $(r_o^2 - r_i^2)/ 2p r_i^2$

(B)  $2p r_i^2/ (r_o^2 - r_i^2)$

(C)  $p (r_o^2 + r_i^2)/ (r_o^2 - r_i^2)$

(D)  $p (r_o^2 - r_i^2)/ (r_o^2 + r_i^2)$

**Answer: C**

**21. A vertical column has two moments of inertia (i.e.  $I_{xx}$  and  $I_{yy}$ ). The column will tend to buckle in the direction of the**

- (A) Axis of load
- (B) Perpendicular to the axis of load
- (C) Maximum moment of inertia
- (D) Minimum moment of inertia

**Answer: D**

**22. Strain energy is the**

- (A) Energy stored in a body when strained within elastic limits
- (B) Energy stored in a body when strained up to the breaking of a specimen
- (C) Maximum strain energy which can be stored in a body
- (D) Proof resilience per unit volume of a material

**Answer: A**

**23. The neutral axis of the cross-section a beam is that axis at which the bending stress is**

- (A) Zero
- (B) Minimum
- (C) Maximum
- (D) Infinity

**Answer: A**

**24. A composite bar made up of steel and copper bars of equal lengths are heated through 100°C. The stresses**

**developed shall be**

- (A) Tensile in both the material
- (B) Tensile in steel and compressive in copper
- (C) Compressive in steel and tensile in copper
- (D) Compressive in both the materials

**Answer: D**

**25. Euler's formula holds good only for**

- (A) Short columns
- (B) Long columns
- (C) Both short and long columns
- (D) Weak columns

**Answer: B**

**26. The bending moment at a point on a beam is the algebraic \_\_\_\_\_ of all the moments on either side of the point.**

- (A) Sum
- (B) Difference
- (C) Multiplication
- (D) None of the above

**Answer: A**

**27. The maximum diameter of the hole that can be punched from a plate of maximum shear stress  $1/4$ th of its maximum crushing stress of punch, is equal to (where  $t$  = Thickness of the plate)**

- (A)  $t$
- (B)  $2t$
- (C)  $4t$
- (D)  $8t$

**Answer: C**

**28. Within elastic limit, stress is**

- (A) Inversely proportional to strain
- (B) Directly proportional to strain
- (C) Square root of strain
- (D) Equal to strain

**Answer: B**

**29. Two closely coiled helical springs ‘A’ and ‘B’ are equal in all respects but the number of turns of spring ‘A’ is half that of spring ‘B’ The ratio of deflections in spring ‘A’ to spring ‘B’ is**

- (A)  $1/8$
- (B)  $1/4$
- (C)  $1/2$

(D) 2

**Answer: C**

**30. The deformation per unit length is called**

(A) Tensile stress

(B) Compressive stress

(C) Shear stress

(D) Strain

**Answer: D**

**31. The shape of cantilever for uniformly distributed load will be**

(A) Straight line

(B) Parabolic

(C) Elliptical

(D) Cubic

**Answer: B**

**32. For a simply supported beam of length 'l', when a concentrated load W is applied in the center of the beam, the maximum deflection is**

(A)  $5WL^3/384EI$

(B)  $WL^3/384EI$

(C)  $WL^3/348EI$

(D)  $WL^3/48EI$

**Answer: D**

**33. The point of contra flexure is a point where**

- (A) Shear force changes sign
- (B) Shear force is maximum
- (C) Bending moment changes sign
- (D) Bending moment is maximum

**Answer: C**

**34. The maximum stress produced in a bar of tapering section is at**

- (A) Smaller end
- (B) Larger end
- (C) Middle
- (D) Anywhere

**Answer: A**

**35. The ultimate tensile stress of mild steel compared to ultimate compressive stress is**

- (A) Same
- (B) More
- (C) Less

(D) Unpredictable

**Answer: B**

**36. The energy stored in a body when strained within elastic limit is known as**

- (A) Resilience
- (B) Proof resilience
- (C) Strain energy
- (D) Impact energy

**Answer: C**

**37. Modular ratio of two materials is the ratio of**

- (A) Strains
- (B) Stress and strain
- (C) Shear stress and shear strain
- (D) Moduli and elasticity

**Answer: D**

**38. In compression test, the fracture in cast iron specimen would occur along**

- (A) The axis of load
- (B) An oblique plane
- (C) At right angles to the axis of specimen

(D) Would not occur

**Answer: B**

**39. A coil is cut into two halves, the stiffness of cut coil will be**

- (A) Double
- (B) Half
- (C) Same
- (D) None of these

**Answer: A**

**40. The bending stress in a beam is \_\_\_\_\_ section modulus.**

- (A) Inversely proportional to two times
- (B) Directly proportional to
- (C) Inversely proportional to
- (D) None of these

**Answer: C**

**41. When shear force at a point is zero, then bending moment is \_\_\_\_\_ at that point.**

- (A) Zero
- (B) Minimum
- (C) Maximum

(D) Infinity

**Answer: C**

**42. Elasticity of Mild Steel specimen is defined by**

(A) Hooke's law

(B) Yield point

(C) Plastic flow

(D) Proof stress

**Answer: C**

**43. When a bar is cooled to -5°C, it will develop**

(A) No stress

(B) Shear stress

(C) Tensile stress

(D) Compressive stress

**Answer: C**

**44. If the radius of wire stretched by a load is doubled, then its Young's modulus will be**

(A) Doubled

(B) Halved

(C) Becomes four times

(D) None of the above

**Answer: D**

**45. In order to know whether a column is long or short, we must know its**

- (A) Ultimate shear stress of the column
- (B) Factor of safety
- (C) Torque resisting capacity
- (D) Slenderness ratio

**Answer: D**

**46. A masonry dam may fail due to**

- (A) Tension in the masonry of the dam and its base
- (B) Overturning of the dam
- (C) Crushing of masonry at the base of the dam
- (D) Any one of the above

**Answer: D**

**47. Impact strength of a material is an index of its**

- (A) Toughness
- (B) Tensile strength
- (C) Capability of being cold worked
- (D) Hardness

**Answer: A**

**48. In order to prevent crushing of masonry at the base of the dam, the maximum stress should be \_\_\_\_\_ the permissible stress of the soil.**

- (A) Equal to
- (B) Less than
- (C) More than
- (D) None of these

**Answer: B**

**49. Volumetric strain for a rectangular specimen of length 'l', breadth 'b' and thickness 't' subjected to a pull of 'P' is given by**

- (A)  $e(l - 2m)$
- (B)  $e(l - 2/m)$
- (C)  $e(m - 2)$
- (D)  $e(2/m - 1)$

**Answer: B**

**50. When a body is subjected to two equal and opposite pushes, as a result of which the body tends to reduce its length, then**

- (A) The stress and strain induced is compressive
- (B) The stress and strain induced is tensile
- (C) Both A and B is correct

(D) None of these

**Answer: A**

**51. A thin cylindrical shell of diameter (d) and thickness (t) is subjected to an internal pressure (p). The ratio of longitudinal strain to volumetric strain is**

(A)  $(m - 1)/(2m - 1)$

(B)  $(2m - 1)/(m - 1)$

(C)  $(m - 2)/(3m - 4)$

(D)  $(m - 2)/(5m - 4)$

**Answer: D**

**52. Modulus of rigidity is defined as the ratio of**

(A) Longitudinal stress to longitudinal strain

(B) Volumetric stress to volumetric strain

(C) Lateral stress to Lateral strain

(D) Shear stress to shear strain

**Answer: D**

**53. In the torsion equation  $T/J = \tau/r = G\theta/L$ , the term  $J/R$  is called**

(A) Shear modulus

(B) Section modulus

(C) Polar modulus

(D) None of these

**Answer: C**

**54. Strain re-setters are used to**

- (A) Measure shear strain
- (B) Measure linear strain
- (C) Measure volumetric strain
- (D) Relieve strain

**Answer: B**

**55. When a rectangular beam is loaded transversely, the maximum compressive stress is developed on the**

- (A) Top layer
- (B) Bottom layer
- (C) Neutral axis
- (D) Every cross-section

**Answer: B**

**56. In a uniform bar, supported at one end in position, the maximum stress under self weight of bar shall occur at the**

- (A) Middle of bar
- (B) Supported end
- (C) Bottom end

(D) None of these

**Answer: B**

**57. When both ends of a column are fixed, the effective length is**

(A) Its own length

(B) Twice its length

(C) Half its length

(D)  $1/\sqrt{2} \times$  its length

**Answer: C**

**58. A composite shaft consisting of two stepped portions having spring constants  $K_1$  and  $K_2$  is held between two rigid supports at the ends. Its equivalent spring constant is**

(A)  $K_1 K_2$

(B)  $(K_1 + K_2)/ 2$

(C)  $(K_1 + K_2)/ K_1 K_2$

(D)  $K_1 K_2/ (K_1 + K_2)$

**Answer: A**

**59. Slenderness of a column is zero when**

(A) Ends are firmly fixed

(B) Column is supported on all sides throughout the length

(C) Length is equal to radius of gyration

- (D) Length is twice the radius of gyration

**Answer: D**

**60. Resilience is the**

- (A) Energy stored in a body when strained within elastic limits
- (B) Energy stored in a body when strained up to the breaking of the specimen maximum strain
- (C) Energy which can be stored in a body
- (D) None of the above

**Answer: D**

**61. When a closely-coiled helical spring of mean diameter (D) is subjected to an axial load (W), the deflection of the spring ( $\delta$ ) is given by (where d = Diameter of spring wire, n = No. of turns of the spring, and C = Modulus of rigidity for the spring material)**

- (A)  $WD^3n/Cd^4$
- (B)  $2WD^3n/Cd^4$
- (C)  $4WD^3n/Cd^4$
- (D)  $8WD^3n/Cd^4$

**Answer: D**

**62. Percentage reduction of area in performing tensile test on cast iron may be of the order of**

- (A) 50%

(B) 25%

(C) 0%

(D) 15%

**Answer: C**

**63. For the beam shown in the below figure, the shear force diagram between A and B is**

(A) A horizontal line

(B) A vertical line

(C) An inclined line

(D) A parabolic curve

**Answer: D**

**64. When a body is subjected to a direct tensile stress ( $\sigma_x$ ) in one plane accompanied by a simple shear stress ( $\tau_{xy}$ ), the maximum normal stress is**

(A)  $(\sigma_x/2) + (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

(B)  $(\sigma_x/2) - (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

(C)  $(\sigma_x/2) + (1/2) \times \sqrt{(\sigma_x^2 - 4 \tau_{xy}^2)}$

(D)  $(1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

**Answer: A**

**65. The materials which exhibit the same elastic properties in all directions are called**

(A) Homogeneous

(B) Inelastic

(C) Isotropic

(D) Isentropic

**Answer: C**

**66. Modulus of rigidity may be defined as the ratio of**

(A) Linear stress to lateral strain

(B) Lateral strain to linear strain

(C) Linear stress to linear strain

(D) Shear stress to shear strain

**Answer: D**

**67. The ratio of lateral strain to the linear strain within elastic limit is known as**

(A) Young's modulus

(B) Bulk modulus

(C) Modulus of rigidity

(D) Poisson's ratio

**Answer: D**

**68. In the below figure, the plastic range occurs**

(A) Before point A

- (B) Beyond point A
- (C) Between points A and D
- (D) Between points D and E

**Answer: B**

**69. Shear modulus is the ratio of**

- (A) Linear stress to linear strain
- (B) Linear stress to lateral strain
- (C) Volumetric strain to linear strain
- (D) Shear stress to shear strain

**Answer: D**

**70. The ratio of elongation in a prismatic bar due to its own weight (W) as compared to another similar bar carrying an additional weight (W) will be**

- (A) 1 : 2
- (B) 1 : 3
- (C) 1 : 4
- (D) 1 : 2.5

**Answer: B**

**71. The weakest section of a diamond riveting is the section which passes through**

- (A) The first row

- (B) The second row
- (C) The central row
- (D) One rivet hole of the end row

**Answer: D**

**72. The shear force diagram for a simply supported beam carrying a uniformly distributed load of  $w$  per unit length, consists of**

- (A) One right angled triangle
- (B) Two right angled triangles
- (C) One equilateral triangle
- (D) Two equilateral triangles

**Answer: B**

**73. Hooke's law holds good up to**

- (A) Yield point
- (B) Limit of proportionality
- (C) Breaking point
- (D) Elastic limit

**Answer: B**

**74. Which of the following statement is correct?**

- (A) The stress is the pressure per unit area

- (B) The strain is expressed in mm
- (C) Hook's law holds good up to the breaking point
- (D) Stress is directly proportional to strain within elastic limit

**Answer: D**

**75. The property of a material which allows it to be drawn into a smaller section is called**

- (A) Plasticity
- (B) Ductility
- (C) Elasticity
- (D) Malleability

**Answer: B**

**76. The percentage reduction in area of a cast iron specimen during tensile test would be of the order of**

- (A) More than 50%
- (B) 25-50%
- (C) 10-25%
- (D) Negligible

**Answer: D**

**77. The deformation of a bar under its own weight is \_\_\_\_\_ the deformation, if the same body is subjected to a direct load equal to weight of the body.**

- (A) Equal to
- (B) Half
- (C) Double
- (D) Quadruple

**Answer: B**

**78. The ratio of maximum shear stress developed in a rectangular beam and a circular beam of the same cross-sectional area is**

- (A) 2/3
- (B) 3/4
- (C) 1
- (D) 9/8

**Answer: D**

**79. Formula based on IS codes is based on**

- (A) Straight line formula
- (B) Euler's formula
- (C) Rankine's formula
- (D) Secant formula

**Answer: D**

**80. Resilience of a material is considered when it is subjected to**

(A) Frequent heat treatment

(B) Fatigue

(C) Creep

(D) Shock loading

**Answer: D**

**81. The buckling load for a given column depends upon**

(A) Area of cross-section of the column

(B) Length and least radius of gyration of the column

(C) Modulus of elasticity for the material of the column

(D) All of the above

**Answer: D**

**82. The shear force at the center of a simply supported beam with a gradually varying load from zero at both ends to  $w$  per meter at the center, is**

(A) Zero

(B)  $wl/4$

(C)  $wl/2$

(D)  $wl^2/2$

**Answer: A**

**83. A riveted joint in which the number of rivets decrease from innermost to outer most rows is called**

- (A) Chain riveted joint
- (B) Diamond riveted joint
- (C) Crisscross riveted joint
- (D) Zigzag riveted joint

**Answer: B**

**84. A closely-coiled helical spring is cut into two halves. The stiffness of the resulting spring will be**

- (A) Same
- (B) Double
- (C) Half
- (D) One-fourth

**Answer: B**

**85. The torsional rigidity of a shaft is expressed by the**

- (A) Maximum torque it can transmit
- (B) Number of cycles it undergoes before failure
- (C) Elastic limit up to which it resists torsion, shear and bending stresses
- (D) Torque required to produce a twist of one radian per unit length of shaft

**Answer: D**

**86. The limit of eccentricity for no tensile conditions for a column of circular section of diameter (d) is**

(A)  $d/4$

(B)  $d/8$

(C)  $d/12$

(D)  $d/16$

**Answer: B**

**87. The property of a material by virtue of which a body returns to its original shape after removal of the load is called**

(A) Plasticity

(B) Elasticity

(C) Ductility

(D) Malleability

**Answer: B**

**88. The state of stress at a point in a loaded member is shown in the below figure. The magnitude of maximum shear stress is**

(A) 10 MPa

(B) 30 MPa

(C) 50 MPa

(D) 100 MPa

**Answer: C**

**89. For a beam, as shown in the below figure, the deflection at C is (where E = Young's modulus for the beam material, and I = Moment of inertia of the beam section.)**

- (A)  $Wl^3/48 EI$
- (B)  $Wa^2b^2/3EI$
- (C)  $[Wa/(a\sqrt{3}) \times EI] \times (l^2 - a^2)3/2$
- (D)  $5Wl^3/384 EI$

**Answer: B**

**90. A concentrated load is one which**

- (A) Acts at a point on a beam
- (B) Spreads non-uniformly over the whole length of a beam
- (C) Spreads uniformly over the whole length of a beam
- (D) Varies uniformly over the whole length of a beam

**Answer: A**

**91. The stress necessary to initiate yielding is**

- (A) Considerably greater than that necessary to continue it
- (B) Considerably lesser than that necessary to continue it
- (C) Greater than that necessary to stop it
- (D) Lesser than that necessary to stop it

**Answer: A**

**92. A lap joint is always in \_\_\_\_\_ shear.**

- (A) Single
- (B) Double
- (C) Both A and B
- (D) None of these

**Answer: A**

**93. When it is indicated that a member is elastic, it means that when force is applied, it will**

- (A) Not deform
- (B) Be safest
- (C) Stretch
- (D) Not stretch

**Answer: C**

**94. For a beam, as shown in the below figure, when the load W is applied in the center of the beam, the maximum deflection is**

- (A)  $Wl^3 / 48EI$
- (B)  $5Wl^3 / 384EI$
- (C)  $Wl^3 / 392EI$
- (D)  $Wl^3 / 384EI$

**Answer: A**

**95. The relation between Young's modulus (E), shear modulus (C) and bulk modulus (K) is given by**

- (A)  $E = 3K.C/(3K + C)$
- (B)  $E = 6K.C/(3K + C)$
- (C)  $E = 9K.C/(3K + C)$
- (D)  $E = 12K.C/(3K + C)$

**Answer: C**

**96. The distance between the centers of the rivets in adjacent rows of zigzag riveted joint is known as**

- (A) Pitch
- (B) Back pitch
- (C) Diagonal pitch
- (D) Diametric pitch

**Answer: C**

**97. In the below figure, the stress corresponding to point 'D' is**

- (A) Yield point stress
- (B) Breaking stress
- (C) Ultimate stress
- (D) Elastic limit

**Answer: C**

**98. A body is subjected to a direct tensile stress of 300 MPa in one plane accompanied by a simple shear stress of 200 MPa. The maximum shear stress will be**

- (A) -100 MPa
- (B) 250 MPa
- (C) 300 MPa
- (D) 400 MPa

**Answer: B**

**99. A cylindrical section having no joint is known as**

- (A) Joint less section
- (B) Homogeneous section
- (C) Perfect section
- (D) Seamless section

**Answer: D**

**100. A beam which is fixed at one end and free at the other is called**

- (A) Simply supported beam
- (B) Fixed beam
- (C) Overhanging beam
- (D) Cantilever beam

**Answer: D**

**101. The neutral axis of a transverse section of a beam passes through the centre of gravity of the section and is**

- (A) In the vertical plane
- (B) In the horizontal plane
- (C) In the same plane in which the beam bends
- (D) At right angle to the plane in which the beam bends

**Answer: D**

**102. The value of Poisson's ratio for steel is between**

- (A) 0.01 to 0.1
- (B) 0.23 to 0.27
- (C) 0.25 to 0.33
- (D) 0.4 to 0.6

**Answer: C**

**103. The columns whose slenderness ratio is less than 80, are known as**

- (A) Short columns
- (B) Long columns
- (C) Weak columns
- (D) Medium columns

**Answer: A**

**104. The stress developed in a material at breaking point in extension is called**

- (A) Breaking stress
- (B) Fracture stress
- (C) Yield point stress
- (D) Ultimate tensile stress

**Answer: A**

**105. For riveting, the size of hole drilled in plates is \_\_\_\_\_ shank diameter of rivet.**

- (A) Equal to
- (B) Less than
- (C) Greater than
- (D) None of these

**Answer: C**

**106. Proof resilience per material is known as**

- (A) Resilience
- (B) Proof resilience
- (C) Modulus of resilience
- (D) Toughness

**Answer: C**

**107. The capacity of a strained body for doing work on the removal of the straining force, is called**

- (A) Strain energy
- (B) Resilience
- (C) Proof resilience
- (D) Impact energy

**Answer: B**

**108. In a tensile test on mild steel specimen, the breaking stress as compared to ultimate tensile stress is**

- (A) More
- (B) Less
- (C) Same
- (D) More/less depending on composition

**Answer: B**

**109. A column of length (l) with both ends fixed may be considered as equivalent to a column of length \_\_\_\_\_ with both ends hinged.**

- (A)  $l/8$
- (B)  $l/4$
- (C)  $l/2$

(D) 1

**Answer: C**

**110. If the depth is kept constant for a beam of uniform strength, then its width will vary in proportional to**

- (A) Bending moment (i.e.  $M$ )
- (B) Bending moment<sup>2</sup> (i.e.  $M^2$ )
- (C) Bending moment<sup>3</sup> (i.e.  $M^3$ )
- (D) Bending moment<sup>4</sup> (i.e.  $M^4$ )

**Answer: A**

**111. In a tensile test, near the elastic limit zone, the**

- (A) Tensile strain increases more quickly
- (B) Tensile strain decreases more quickly
- (C) Tensile strain increases in proportion to the stress
- (D) Tensile strain decreases in proportion to the stress

**Answer: A**

**112. The pull required to crush the rivet per pitch length is**

- (A)  $p.t.\sigma t$
- (B)  $d.t.\sigma c$
- (C)  $\pi/4 \times d^2 \times \sigma t$
- (D)  $\pi/4 \times d^2 \times \sigma c$

**Answer: B**

**113. The total strain energy stored in a body is termed as**

- (A) Resilience
- (B) Proof resilience
- (C) Modulus of resilience
- (D) Toughness

**Answer: A**

**114. The extension of a circular bar tapering uniformly from diameter  $d_1$  at one end to diameter  $d_2$  at the other end and subjected to an axial pull of 'P' is given by**

- (A)  $\delta l = 4PE/\pi l^2$
- (B)  $\delta l = 4\pi ld^2/PE$
- (C)  $\delta l = 4Pl/\pi Ed_1d_2$
- (D)  $\delta l = 4PlE/\pi d_1d_2$

**Answer: C**

**115. The maximum bending moment for the beam shown in the below figure, is**

- (A)  $wl^2/3\sqrt{3}$
- (B)  $wl^2/6\sqrt{3}$
- (C)  $wl^2/9\sqrt{3}$
- (D)  $wl^2/12\sqrt{3}$

**Answer: C**

**116. Efficiency of a riveted joint is the ratio of its strength (max. load it can resist without failure) to the strength of the unpunched plate in**

- (A) Tension
- (B) Compression
- (C) Bearing
- (D) Any one of the above

**Answer: A**

**117. The pull required to tear off the plate per pitch length is (where  $p$  = Pitch of rivets,  $t$  = Thickness of plates, and  $\sigma_t$ ,  $\tau$  and  $\sigma_c$  = Permissible tensile, shearing and crushing stresses respectively)**

- (A)  $(p - 2d)t \times \sigma_c$
- (B)  $(p - d)t \times \tau$
- (C)  $(p - d)t \times \sigma_t$
- (D)  $(2p - d)t \times \sigma_t$

**Answer: C**

**118. In a belt drive, the pulley diameter is doubled, the belt tension and pulley width remaining same. The changes required in key will be**

- (A) Increase key length
- (B) Increase key depth

- (C) Increase key width
- (D) Double all the dimensions

**Answer: C**

**119. In the below figure, curve D represents\_\_\_\_\_.**

- (A) Mild steel
- (B) Cast iron
- (C) Concrete
- (D) Bone of these

**Answer: A**

**120. The bending moment of a cantilever beam of length 'l' and carrying a uniformly distributed load of 'w' per unit length is \_\_\_\_\_ at the fixed end.**

- (A)  $wl/4$
- (B)  $wl/2$
- (C)  $wl$
- (D)  $wl^2/2$

**Answer: D**

**121. Young's modulus is defined as the ratio of**

- (A) Volumetric stress and volumetric strain
- (B) Lateral stress and lateral strain

(C) Longitudinal stress and longitudinal strain

(D) Shear stress to shear strain

**Answer: C**

**122. The layer at the center of gravity of the beam as shown in the below figure, will be**

(A) In tension

(B) In compression

(C) Neither in tension nor in compression

(D) None of these

**Answer: C**

**123. When a body is subjected to a direct tensile stress ( $\sigma_x$ ) in one plane accompanied by a simple shear stress ( $\tau_{xy}$ ), the minimum normal stress is**

(A)  $(\sigma_x/2) + (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

(B)  $(\sigma_x/2) - (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

(C)  $(\sigma_x/2) + (1/2) \times \sqrt{(\sigma_x^2 - 4 \tau_{xy}^2)}$

(D)  $(1/2) \times \sqrt{(\sigma_x^2 + 4 \tau_{xy}^2)}$

**Answer: B**

**124. Tensile strength of a material is obtained by dividing the maximum load during the test by the**

(A) Area at the time of fracture

(B) Original cross-sectional area

(C) Average of (A) and (B)

(D) Minimum area after fracture

**Answer: B**

**125. The section modulus of a circular section about an axis through its C.G., is**

(A)  $\pi d^2/4$

(B)  $\pi d^2/16$

(C)  $\pi d^3/16$

(D)  $\pi d^3/32$

**Answer: D**

**126. If a part is constrained to move and heated, it will develop**

(A) Principal stress

(B) Tensile stress

(C) Compressive stress

(D) Shear stress

**Answer: C**

**127. The moment of resistance of a balanced reinforced concrete beam is based on the stresses in**

(A) Steel only

- (B) Concrete only
- (C) Steel and concrete both
- (D) None of these

**Answer: C**

**128. The property of a material by virtue of which it can be beaten or rolled into plates is called**

- (A) Malleability
- (B) Ductility
- (C) Plasticity
- (D) Elasticity

**Answer: A**

**129. In case of an under-reinforced beam, the depth of actual neutral axis is \_\_\_\_\_ that of the critical neutral axis.**

- (A) Same as
- (B) Less than
- (C) Greater than
- (D) None of these

**Answer: B**

**130. The energy absorbed in a body, when it is strained within the elastic limits, is known as**

- (A) Strain energy
- (B) Resilience
- (C) Proof resilience
- (D) Modulus of resilience

**Answer: A**

**131. A simply supported beam with a gradually varying load from zero at 'B' and 'w' per unit length at 'A' is shown in the below figure. The shear force at 'B' is equal to**

- (A)  $wl/6$
- (B)  $wl/3$
- (C)  $wl$
- (D)  $2wl/3$

**Answer: A 1**

**132. A fletched beam is used to**

- (A) Change the shape of the beam
- (B) Effect the saving in material
- (C) Equalize the strength in tension and compression
- (D) Increase the cross-section of the beam

**Answer: C**

**133. Percentage reduction in area performing tensile test on cast iron may be of the order of**

(A) 50%

(B) 25%

(C) 20%

(D) 30%

**Answer: C**

**134. A beam is loaded as cantilever. If the load at the end is increased, the failure will occur**

(A) In the middle

(B) At the tip below the load

(C) At the support

(D) Anywhere

**Answer: D**

**135. The assumption made in Euler's column theory is that**

(A) The failure of column occurs due to buckling alone

(B) The length of column is very large as compared to its cross-sectional dimensions

(C) The column material obeys Hooke's law

(D) All of the above

**Answer: D**

**136. If the rivets in adjacent rows are staggered and the outermost row has only one rivets, the arrangement of the**

**rivets is called**

- (A) Chain riveting
- (B) Zigzag riveting
- (C) Diamond riveting
- (D) Crisscross riveting

**Answer: C**

**137. The point of contraflexure is a point where**

- (A) Shear force changes sign
- (B) Bending moment changes sign
- (C) Shear force is maximum
- (D) Bending moment is maximum

**Answer: B**

**138. The value of shear stress which is induced in the shaft due to the applied couple varies**

- (A) From maximum at the center to zero at the circumference
- (B) From zero at the center to maximum at the circumference
- (C) From maximum at the center to minimum at the circumference
- (D) From minimum at the center to maximum at the circumference

**Answer: B**

**139. The extremities of any diameter on Mohr's circle represent**

- (A) Principal stresses
- (B) Normal stresses on planes at  $45^\circ$
- (C) Shear stresses on planes at  $45^\circ$
- (D) Normal and shear stresses on a plane

**Answer: B****140. The materials having same elastic properties in all directions are called**

- (A) Ideal materials
- (B) Uniform materials
- (C) Isotropic materials
- (D) Piratical materials

**Answer: C****141. The ratio of the largest load in a test to the original cross-sectional area of the test piece is called**

- (A) Elastic limit
- (B) Yield stress
- (C) Ultimate stress
- (D) Breaking stress

**Answer: C**

**142. A column is said to be a short column, when**

- (A) Its length is very small
- (B) Its cross-sectional area is small
- (C) The ratio of its length to the least radius of gyration is less than 80
- (D) The ratio of its length to the least radius of gyration is more than 80

**Answer: C****143. The total elongation produced in a bar of uniform section hanging vertically downwards due to its own weight is equal to that produced by a weight**

- (A) Of same magnitude as that of bar and applied at the lower end
- (B) Half the weight of bar applied at lower end
- (C) Half of the square of weight of bar applied at lower end
- (D) One fourth of weight of bar applied at lower end

**Answer: B****144. The lower layer of the beam as shown in the below figure, will be**

- (A) In tension
- (B) In compression
- (C) Neither in tension nor in compression
- (D) None of these

**Answer: A**

**145. The tensile strength of the welded joint for double fillet is (where  $s$  = Leg or size of the weld,  $l$  = Length of weld, and  $\sigma_t$  = Allowable tensile stress for weld metal)**

- (A)  $0.5 s.l.\sigma_t$
- (B)  $s.l.\sigma_t$
- (C)  $\sqrt{2} s.l.\sigma_t$
- (D)  $2.s.l.\sigma_t$

**Answer: C**

**146. If a material expands freely due to heating it will develop**

- (A) Thermal stresses
- (B) Tensile stress
- (C) Bending
- (D) No stress

**Answer: D**

**147. When a body is subjected to biaxial stress i.e. direct stresses ( $\sigma_x$ ) and ( $\sigma_y$ ) in two mutually perpendicular planes accompanied by a simple shear stress ( $\tau_{xy}$ ), then maximum normal stress is**

- (A)  $(\sigma_x + \sigma_y)/2 + (1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (B)  $(\sigma_x + \sigma_y)/2 - (1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4 \tau^2_{xy}]}$

(C)  $(\sigma_x - \sigma_y)/2 + (1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4 \tau^2 xy]}$

(D)  $(\sigma_x - \sigma_y)/2 - (1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4 \tau^2 xy]}$

**Answer: A**

**148. The stress at which extension of the material takes place more quickly as compared to the increase in load is called**

(A) Elastic point of the material

(B) Plastic point of the material

(C) Breaking point of the material

(D) Yielding point of the material

**Answer: D**

**149. A cantilever beam is one which is**

(A) Fixed at both ends

(B) Fixed at one end and free at the other end

(C) Supported at its ends

(D) Supported on more than two supports

**Answer: B**

**150. In a prismatic member made of two materials so joined that they deform equally under axial stress, the unit stresses in two materials are**

(A) Equal

(B) Proportional to their respective moduli of elasticity

(C) Inversely proportional to their moduli of elasticity

(D) Average of the sum of moduli of elasticity

**Answer: B**

**151.** A circular shaft fixed at, A has diameter D for half of its length and diameter  $D/2$  over the other half, as shown in the below figure. If the rotation of B relative to A is 0.1 radian, the rotation of C relative to B will be

(A) 0.4 radian

(B) 0.8 radian

(C) 1.6 radian

(D) 3.2 radian

**Answer: C**

**152.** The shear force diagram of a cantilever beam of length 'l' and carrying a uniformly distributed load of  $w$  per unit length will be

(A) A right angled triangle

(B) An isosceles triangle

(C) An equilateral triangle

(D) A rectangle

**Answer: A**

**153. The safe twisting moment for a compound shaft is equal to the**

- (A) Maximum calculated value
- (B) Minimum calculated value
- (C) Mean value
- (D) Extreme value

**Answer: B**

**154. When a bar is subjected to a change of temperature and its deformation is prevented, the stress induced in the bar is**

- (A) Tensile stress
- (B) Compressive stress
- (C) Shear stress
- (D) Thermal stress

**Answer: D**

**155. A thin mild steel wire is loaded by adding loads in equal increments till it breaks. The extensions noted with increasing loads will behave as under**

- (A) Uniform throughout
- (B) Increase uniformly
- (C) First increase and then decrease
- (D) Increase uniformly first and then increase rapidly

**Answer: D**

**156. Which of the following is a proper sequence?**

- (A) Proportional limit, elastic limit, yielding, failure
- (B) Elastic limit, proportional limit, yielding, failure
- (C) Yielding, proportional limit, elastic limit, failure
- (D) None of the above

**Answer: A**

**157. Which is the false statement about true stress strain method?**

- (A) It does not exist
- (B) It is more sensitive to changes in both metallurgical and mechanical conditions
- (C) It gives a more accurate picture of the ductility
- (D) It can be correlated with stress strain values in other tests like torsion, impact, combined stress tests etc.

**Answer: A**

**158. The bending equation is**

- (A)  $M/I = \sigma/y = E/R$
- (B)  $T/J = \tau/R = C\theta/l$
- (C)  $M/R = T/J = C\theta/l$
- (D)  $T/l = \tau/J = R/C\theta$

**Answer: A**

**159. For which material the Poisson's ratio is more than unity**

- (A) Steel
- (B) Copper
- (C) Aluminium
- (D) None of the above

**Answer: D**

**160. When a body is subjected to a direct tensile stress ( $\sigma$ ) in one plane, then maximum normal stress occurs at a section inclined at \_\_\_\_\_ to the normal of the section.**

- (A)  $0^\circ$
- (B)  $30^\circ$
- (C)  $45^\circ$
- (D)  $90^\circ$

**Answer: A**

**161. Flow stress corresponds to**

- (A) Fluids in motion
- (B) Breaking point
- (C) Plastic deformation of solids
- (D) Rupture stress

**Answer: C**

**162. The thickness of a thin cylindrical shell with hemispherical ends is \_\_\_\_\_ that of spherical ends.**

- (A) Equal to
- (B) More than
- (C) Less than
- (D) None of these

**Answer: B**

**163. A riveted joint in which every rivet of a row is opposite to other rivet of the outer row, is known as**

- (A) Chain riveted joint
- (B) Diamond riveted joint
- (C) Crisscross riveted joint
- (D) Zigzag riveted joint

**Answer: A**

**164. The maximum tangential stress in a thick cylindrical shell is always \_\_\_\_\_ the internal pressure acting on the shell.**

- (A) Equal to
- (B) Less than
- (C) Greater than

(D) None of these

**Answer: C**

**165. If percentage reduction in area of a certain specimen made of material 'A' under tensile test is 60% and the percentage reduction in area of a specimen with same dimensions made of material 'B' is 40%, then**

- (A) The material A is more ductile than material B
- (B) The material B is more ductile than material A
- (C) The ductility of material A and B is equal
- (D) The material A is brittle and material B is ductile

**Answer: A**

**166. Which of the following materials is most elastic?**

- (A) Rubber
- (B) Plastic
- (C) Brass
- (D) Steel

**Answer: D**

**167. Strain is equal to (where  $l$  = Original length, and  $\delta l$  = Change in length)**

- (A)  $l/\delta l$
- (B)  $\delta l/l$

(C)  $l \cdot \delta l$

(D)  $l + \delta l$

**Answer: B**

**168. The ratio of direct stress to volumetric strain in case of a body subjected to three mutually perpendicular stresses of equal intensity, is equal to**

(A) Young's modulus

(B) Bulk modulus

(C) Modulus of rigidity

(D) Modulus of elasticity

**Answer: B**

**169. Which of the following statement is wrong?**

(A) The deformation of the bar per unit length in the direction of the force is called linear strain.

(B) The Poisson's ratio is the ratio of lateral strain to the linear strain.

(C) The ratio of change in volume to the original volume is called volumetric strain.

(D) The bulk modulus is the ratio of linear stress to the linear strain.

**Answer: D**

**170. Diamond riveted joint can be adopted in the case of following type of joint**

(A) Butt joint

- (B) Lap joint
- (C) Double riveted lap joints
- (D) All types of joints

**Answer: A**

**171. When a body is subjected to biaxial stress i.e. direct stresses ( $\sigma_x$ ) and ( $\sigma_y$ ) in two mutually perpendicular planes accompanied by a simple shear stress ( $\tau_{xy}$ ), then minimum normal stress is**

- (A)  $(\sigma_x + \sigma_y)/2 + (1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (B)  $(\sigma_x + \sigma_y)/2 - (1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (C)  $(\sigma_x - \sigma_y)/2 + (1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (D)  $(\sigma_x - \sigma_y)/2 - (1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4 \tau^2_{xy}]}$

**Answer: B**

**172. The unit of Young's modulus is**

- (A) mm/mm
- (B) kg/cm
- (C) Kg
- (D) kg/cm<sup>2</sup>

**Answer: D**

**173. When a body is subjected to three mutually perpendicular stresses, of equal intensity, the ratio of direct stress to the corresponding volumetric strain is known as**

- (A) Young's modulus
- (B) Modulus of rigidity
- (C) Bulk modulus
- (D) Poisson's ratio

**Answer: C**

**174. The value of modulus of elasticity for mild steel is of the order of**

- (A)  $2.1 \times 10^5 \text{ kg/cm}^2$
- (B)  $2.1 \times 10^6 \text{ kg/cm}^2$
- (C)  $2.1 \times 10^7 \text{ kg/cm}^2$
- (D)  $0.1 \times 10^6 \text{ kg/cm}^2$

**Answer: B**

**175. A pressure vessel is said to be a thick shell, when**

- (A) It is made of thick sheets
- (B) The internal pressure is very high
- (C) The ratio of wall thickness of the vessel to its diameter is less than  $1/10$ .
- (D) The ratio of wall thickness of the vessel to its diameter is greater than  $1/10$ .

**Answer: D**

**176. The strain energy stored in a body due to suddenly applied load compared to when it is applied gradually is**

- (A) Same
- (B) Twice
- (C) Four times
- (D) Eight times

**Answer: C**

**177. The deformation of a bar under its own weight compared to the deformation of same body subjected to a direct load equal to weight of the body is**

- (A) Same
- (B) Double
- (C) Half
- (D) Four times

**Answer: C**

**178. A continuous beam is one which is**

- (A) Fixed at both ends
- (B) Fixed at one end and free at the other end
- (C) Supported on more than two supports
- (D) Extending beyond the supports

**Answer: C**

**179. The radius of the Mohr's circle in the given figure is equal to**

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- (A) Sum of two principal stresses
- (B) Difference of two principal stresses
- (C) Half the sum of two principal stresses
- (D) Half the difference of two principal stresses

**Answer: D**

**180. The maximum shear stress, in the given figure, is equal to \_\_\_\_\_ of the Mohr's circle.**

- (A) Radius
- (B) Diameter
- (C) Circumference
- (D) Area

**Answer: A**

**181. A key is subjected to side pressure as well at shearing forces. These pressures are called**

- (A) Bearing stresses
- (B) Fatigue stresses
- (C) Crushing stresses
- (D) Resultant stresses

**Answer: A**

**182. When a closely-coiled helical spring of mean diameter (D) is subjected to an axial load (W), the stiffness of the spring is given by**

- (A)  $Cd^4/D3n$
- (B)  $Cd^4/2D3n$
- (C)  $Cd^4/4D3n$
- (D)  $Cd^4/8D3n$

**Answer: D**

**183. During a tensile test on a specimen of 1 cm cross-section, maximum load observed was 8 tonnes and area of cross-section at neck was 0.5 cm<sup>2</sup>. Ultimate tensile strength of specimen is**

- (A) 4 tonnes/ cm<sup>2</sup>
- (B) 8 tonnes/ cm<sup>2</sup>
- (C) 16 tonnes/ cm<sup>2</sup>
- (D) 22 tonnes/ cm<sup>2</sup>

**Answer: B**

**184. When a body is subjected to a direct tensile stress ( $\sigma_x$ ) in one plane accompanied by a simple shear stress ( $\tau_{xy}$ ), the maximum shear stress is**

- (A)  $(\sigma_x/2) + (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau^2 xy)}$
- (B)  $(\sigma_x/2) - (1/2) \times \sqrt{(\sigma_x^2 + 4 \tau^2 xy)}$

(C)  $(\sigma x/2) + (1/2) \times \sqrt{(\sigma x^2 - 4 \tau^2 xy)}$

(D)  $(1/2) \times \sqrt{(\sigma x^2 + 4 \tau^2 xy)}$

**Answer: D**

**185. The change in the unit volume of a material under tension with increase in its Poisson's ratio will**

- (A) Increase
- (B) Decrease
- (C) Remain same
- (D) Increase initially and then decrease

**Answer: B**

**186. A material capable of absorbing large amount of energy before fracture is known as**

- (A) Ductility
- (B) Toughness
- (C) Resilience
- (D) Shock proof

**Answer: B**

**187. The shear force at the ends of a simply supported beam carrying a uniformly distributed load of w per unit length is**

- (A) Zero at its both ends
- (B)  $wl$  at one end and  $-wl$  at the other end

(C)  $wl/2$  at one end and  $-wl/2$  at the other end

(D)  $wl^2/2$  at one end and  $-wl^2/2$  at the other end

**Answer: C**

**188. Deformation per unit length in the direction of force is known as**

(A) Strain

(B) Lateral strain

(C) Linear strain

(D) Linear stress

**Answer: C**

**189. Which of the following statement is correct?**

(A) The energy stored in a body, when strained within elastic limit is known as strain energy.

(B) The maximum strain energy which can be stored in a body is termed as proof resilience.

(C) The proof resilience per unit volume of a material is known as modulus of resilience.

(D) All of the above

**Answer: D**

**190. Rupture stress is**

(A) Breaking stress

(B) Maximum load/original cross-sectional area

(C) Load at breaking point/Area

(D) Load at breaking point/neck area

**Answer: D**

**191. When two shafts of same length, one of which is hollow, transmit equal torques and have equal maximum stress, then they should have equal**

(A) Polar moment of inertia

(B) Polar modulus

(C) Diameter

(D) Angle of twist

**Answer: B**

**192. Longitudinal stress in a thin cylinder is**

(A) Equal to the hoop stress

(B) Twice the hoop stress

(C) Half of the hoop stress

(D) One fourth of hoop stress

**Answer: C**

**193. A beam of uniform strength may be obtained by**

(A) Keeping the width uniform and varying the depth

- (B) Keeping the depth uniform and varying the width
- (C) Varying the width and depth both
- (D) Any one of the above

**Answer: D**

**194. Which of the following has no unit?**

- (A) Kinematic viscosity
- (B) Surface tension
- (C) Bulk modulus
- (D) Strain

**Answer: D**

**195. The deformation of the bar per unit length in the direction of the force is known as**

- (A) Linear strain
- (B) Lateral strain
- (C) Volumetric strain
- (D) Shear strain

**Answer: A**

**196. In the below figure, \_\_\_\_\_ represents glass.**

- (A) Curve A
- (B) Curve B

(C) Curve C

(D) Curve D

**Answer: C**

**197. Hook's law holds good up to**

(A) Yield point

(B) Elastic limit

(C) Plastic limit

(D) Breaking point

**Answer: B**

**198. A thin spherical shell of diameter (d) and thickness (t) is subjected to an internal pressure (p). The stress in the shell material is**

(A)  $pd/t$

(B)  $pd/2t$

(C)  $pd/4t$

(D)  $pd/8t$

**Answer: C**

**199. Poisson's ratio is defined as the ratio of**

(A) Longitudinal stress and longitudinal strain

(B) Longitudinal stress and lateral stress

(C) Lateral stress and longitudinal stress

(D) Lateral stress and lateral strain

**Answer: C**

**200.** The rectangular beam 'A' has length l, width b and depth d. Another beam 'B' has the same length and width but depth is double that of 'A'. The elastic strength of beam B will be \_\_\_\_\_ as compared to beam A.

(A) Same

(B) Double

(C) Four times

(D) Six times

**Answer: C**

**201.** The value of Poisson's ratio for cast iron is

(A) 0.1 to 0.2

(B) 0.23 to 0.27

(C) 0.25 to 0.33

(D) 0.4 to 0.6

**Answer: B**

**202.** According to Euler's column theory, the crippling load of a column is given by  $p = \pi^2 EI/Cl^2$ . In the Euler's formula, the value of C for a column with one end fixed and the other end free, is

(A) 1/2

(B) 1

(C) 2

(D) 4

**Answer: D**

**203. The elasticity of various materials is controlled by its**

(A) Ultimate tensile stress

(B) Proof stress

(C) Stress at yield point

(D) Stress at elastic limit

**Answer: D**

**204. A simply supported beam of length 'l' carries a point load 'W' at a point C as shown in the below figure. The maximum deflection lies at**

(A) Point A

(B) Point B

(C) Point C

(D) Between points B and C

**Answer: D**

**205. The shear force diagram for a cantilever beam of length l and carrying a gradually varying load from zero at**

**free end and w per unit length at the fixed end is a**

- (A) Horizontal straight line
- (B) Vertical straight line
- (C) Inclined line
- (D) Parabolic curve

**Answer: D**

**206. The maximum shear stress in a thin cylindrical shell subjected to internal pressure 'p' is**

- (A)  $pd/t$
- (B)  $pd/2t$
- (C)  $pd/4t$
- (D)  $pd/8t$

**Answer: D**

**207. When a beam is subjected to bending moment, the stress at any point is \_\_\_\_\_ the distance of the point from the neutral axis.**

- (A) Equal to
- (B) Directly proportional to
- (C) Inversely proportional to
- (D) Independent of

**Answer: B**

**208. In a tensile test, when the material is stressed beyond elastic limit, the tensile strain \_\_\_\_\_ as compared to the stress.**

- (A) Decreases slowly
- (B) Increases slowly
- (C) Decreases more quickly
- (D) Increases more quickly

**Answer: D**

**209. A fixed beam is one which is fixed at \_\_\_\_\_.**

- (A) One of its ends
- (B) Both of its ends
- (C) The middle
- (D) None of these

**Answer: B**

**210. If the modulus of elasticity for a given material is twice its modulus of rigidity, then bulk modulus is equal to**

- (A)  $2C$
- (B)  $3C$
- (C)  $2C/3$
- (D)  $3C/2$

**Answer: C**

**211. When a load on the free end of a cantilever beam is increased, failure will occur**

- (A) At the free end
- (B) At the fixed end
- (C) In the middle of the beam
- (D) At a distance  $2l/3$  from free end

**Answer: B**

**212. The rectangular beam ‘A’ has length l, width b and depth d. Another beam ‘B’ has the same width and depth but length is double that of ‘A’. The elastic strength of beam ‘B’ will be \_\_\_\_\_ as compared to beam A.**

- (A) Same
- (B) One-half
- (C) One-fourth
- (D) One-eighth

**Answer: B**

**213. In leaf springs, the maximum bending stress developed in the plates is (where W = Load acting on the spring, l = Span of the spring, n = Number of plates, b = Width of plates, and t = Thickness of plates)**

- (A)  $Wl/nbt^2$
- (B)  $3Wl/2nbt^2$
- (C)  $2Wl/nbt^2$

(D)  $3Wl/nbt^2$

**Answer: B**

**214. The extension of a circular bar tapering uniformly from diameter  $d_1$  at one end to diameter  $d_2$  at the other end, and subjected to an axial pull of  $P$  is \_\_\_\_\_ the extension of a circular bar of diameter  $d_1 d_2$  subjected to the same load  $P$ .**

- (A) Equal to
- (B) Less than
- (C) Greater than
- (D) None of these

**Answer: A**

**215. In a thick cylindrical shell subjected to an internal pressure ( $p$ ), the radial stress across the thickness of the cylinder is**

- (A) Maximum at the outer surface and minimum at the inner surface
- (B) Maximum at the inner surface and minimum at the outer surface
- (C) Maximum at the outer surface and zero at the inner surface
- (D) Maximum at the inner surface and zero at the outer surface

**Answer: D**

**216. A column with maximum equivalent length has**

- (A) Both ends hinged

- (B) Both ends fixed
- (C) One end fixed and the other end hinged
- (D) One end fixed and the other end free

**Answer: D**

**217. The ratio of change in volume to the original volume is called**

- (A) Linear strain
- (B) Lateral strain
- (C) Volumetric strain
- (D) Poisson's ratio

**Answer: C**

**218. Which of the following statement is wrong?**

- (A) In the theory of simple bending, the assumption is that the plane sections before bending remains plane after bending.
- (B) In a beam subjected to bending moment, the strain is directly proportional to the distance from the neutral axis.
- (C) At the neutral axis of a beam, the bending stress is maximum.
- (D) The bending stress in a beam is inversely proportional to the section modulus.

**Answer: C**

**219. The polar moment of inertia of a solid circular shaft of diameter (D) is**

(A)  $\pi D^3/16$

(B)  $\pi D^3/32$

(C)  $\pi D^4/32$

(D)  $\pi D^4/64$

**Answer: C**

**220. In Mohr's circle, the center of circle from Y-axis is taken as**

(A)  $(\sigma_x - \sigma_y)/2$

(B)  $(\sigma_x + \sigma_y)/2$

(C)  $[(\sigma_x - \sigma_y)/2] + \tau$

(D)  $[(\sigma_x + \sigma_y)/2] + \tau$

**Answer: B**

**221. Shear strength of the welded joint for double parallel fillet is (where  $\tau$  = Allowable shear stress for weld metal)**

(A)  $0.5 s.l.\tau$

(B)  $s.l.\tau$

(C)  $\sqrt{2} s.l.\tau$

(D)  $2.s.l.\tau$

**Answer: C**

**222. When a shaft, is subjected to torsion, the shear stress induced in the shaft varies from**

- (A) Minimum at the center to maximum at the circumference
- (B) Maximum at the center to minimum at the circumference
- (C) Zero at the center to maximum at the circumference
- (D) Maximum at the center to zero at the circumference

**Answer: C**

**223. The strain energy stored in a body, when the load is gradually applied, is (where  $\sigma$  = Stress in the material of the body,  $V$  = Volume of the body, and  $E$  = Modulus of elasticity of the material)**

- (A)  $\sigma E/V$
- (B)  $\sigma V/E$
- (C)  $\sigma^2 E/2V$
- (D)  $\sigma^2 V/2E$

**Answer: D**

**224. At the neutral axis of a beam, the shear stress is**

- (A) Zero
- (B) Minimum
- (C) Maximum
- (D) Infinity

**Answer: C**

**225. In a stress-strain diagram for mild steel, as shown in the below figure, the point 'A' represents**

- (A) Elastic limit
- (B) Upper yield point
- (C) Lower yield point
- (D) Breaking point

**Answer: A**

**226. When a body is subjected to two equal and opposite forces, acting tangentially across the resisting section, as a result of which the body tends to shear off across the section, the stress and strain induced is**

- (A) Tensile stress, tensile strain
- (B) Compressive stress, compressive strain
- (C) Shear stress, tensile strain
- (D) Shear stress, shear strain

**Answer: D**

**227. The given figure shows the Mohr's circle of stress for two unequal and like principal stresses ( $\sigma_x$  and  $\sigma_y$ ) acting at a body across two mutually perpendicular planes. The tangential stress is given by**

- (A) OC
- (B) OP
- (C) OQ

(D) PQ

**Answer: D**

**228. The strain energy stored in a hollow circular shaft of outer diameter (D) and inner diameter (d) subjected to shear stress is**

(A)  $(\tau^2/2C)(D^2 - d^2/D) \times \text{Volume of shaft}$

(B)  $(\tau^2/2C)(D^2 + d^2/D) \times \text{Volume of shaft}$

(C)  $(\tau^2/4C)(D^2 - d^2/D) \times \text{Volume of shaft}$

(D)  $(\tau^2/4C)(D^2 + d^2/D) \times \text{Volume of shaft}$

**Answer: D**

**229. The center to center distance, between two consecutive rivets in a row, is called**

(A) Margin

(B) Pitch

(C) Back pitch

(D) Diagonal pitch

**Answer: B**

**230. Two shafts 'A' and 'B' are made of same material. The shaft 'A' is of diameter D and shaft 'B' is of diameter D/2. The strength of shaft 'B' is \_\_\_\_\_ as that of shaft 'A'**

(A) One-eighth

(B) One-fourth

- (C) One-half
- (D) Four times

**Answer: A**

**231. According to Unwin's formula, the relation between diameter of rivet hole ( $d$ ) and thickness of plate ( $t$ ) is given by (where  $d$  and  $t$  are in mm)**

- (A)  $d = t$
- (B)  $d = 1.6 t$
- (C)  $d = 2t$
- (D)  $d = 6t$

**Answer: D**

**232. A tensile test is performed on a round bar. After fracture, it has been found that the diameter remains approximately same at fracture. The material under test was**

- (A) Mild steel
- (B) Cast iron
- (C) Glass
- (D) Copper

**Answer: B**

**233. A rectangular beam of length  $l$  supported at its two ends carries a central point load  $W$ . The maximum deflection occurs**

- (A) At the ends
- (B) At  $l/3$  from both ends
- (C) At the center
- (D) None of these

**Answer: C**

**234. The ratio of the lateral strain to the linear strain is called**

- (A) Modulus of elasticity
- (B) Modulus of rigidity
- (C) Bulk modulus
- (D) Poisson's ratio

**Answer: D**

**235. The shear force of a cantilever beam of length  $l$  carrying a uniformly distributed load of  $w$  per unit length is \_\_\_\_\_ at the free end.**

- (A) Zero
- (B)  $wl/4$
- (C)  $wl/2$
- (D)  $wl$

**Answer: A**

**236. In a simple bending of beams, the stress in the beam varies**

- (A) Linearly
- (B) Parabolically
- (C) Hyperbolically
- (D) Elliptically

**Answer: A**

**237. The shear force at a point on a beam is the algebraic \_\_\_\_\_ of all the forces on either side of the point.**

- (A) Sum
- (B) Difference
- (C) Multiplication
- (D) Division

**Answer: A**

**238. When a cantilever beam is loaded at its free end, the maximum compressive stress shall develop at**

- (A) Bottom fibre
- (B) Top fibre
- (C) Neutral axis
- (D) Center of gravity

**Answer: A**

**239. The total strain energy stored in a body is termed as**

- (A) Resilience
- (B) Proof resilience
- (C) Impact energy
- (D) Modulus of resilience

**Answer: A**

**240. When a body is subjected to biaxial stress i.e. direct stresses ( $\sigma_x$ ) and ( $\sigma_y$ ) in two mutually perpendicular planes accompanied by a simple shear stress ( $\tau_{xy}$ ), then maximum shear stress is**

- (A)  $(1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (B)  $(1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4 \tau^2_{xy}]}$
- (C)  $\sqrt{[(\sigma_x - \sigma_y)^2 + \tau^2_{xy}]}$
- (D)  $\sqrt{[(\sigma_x + \sigma_y)^2 + \tau^2_{xy}]}$

**Answer: A**

**241. According to Euler's column theory, the crippling load for a column length (l) hinged at both ends, is**

- (A)  $\pi^2 EI/l^2$
- (B)  $\pi^2 EI/4l^2$
- (C)  $4\pi^2 EI/l^2$
- (D)  $2\pi^2 EI/l^2$

**Answer: A**

**242.** A thin cylindrical shell of diameter (d), length (l) and thickness (t) is subjected to an internal pressure (p). The ratio of longitudinal strain to hoop strain is

- (A)  $(m - 2)/(2m - 1)$
- (B)  $(2m - 1)/(m - 2)$
- (C)  $(m - 2)/(2m + 1)$
- (D)  $(2m + 1)/(m - 2)$

**Answer: A**

**243.** Young's modulus may be defined as the ratio of

- (A) Linear stress to lateral strain
- (B) Lateral strain to linear strain
- (C) Linear stress to linear strain
- (D) Shear stress to shear strain

**Answer: C**

**244.** The maximum bending moment for the beam shown in the below figure, lies at a distance of \_\_\_\_\_ from the end B.

- (A)  $l/2$
- (B)  $l/3$
- (C)  $l/\sqrt{2}$

(D)  $1/\sqrt{3}$

**Answer: D**

**245.** Two closely-coiled helical springs ‘A’ and ‘B’ are equal in all respects but the number of turns of spring ‘A’ is double that of spring ‘B’. The stiffness of spring ‘A’ will be \_\_\_\_\_ that of spring ‘B’.

(A) One-sixteenth

(B) One-eighth

(C) One-fourth

(D) One-half

**Answer: D**

**246.** The bending moment on a section is maximum where shear force is

(A) Minimum

(B) Maximum

(C) Changing sign

(D) Zero

**Answer: C**

**247.** The stress developed in the material without any permanent set is called

(A) Elastic limit

(B) Yield stress

(C) Ultimate stress

(D) Breaking stress

**Answer: A**

**248. Two closely coiled helical springs ‘A’ and ‘B’ are equal in all respects but the diameter of wire of spring ‘A’ is double that of spring ‘B’ The stiffness of spring ‘B’ will be \_\_\_\_\_ that of spring ‘A’**

(A) One-sixteenth

(B) One-eighth

(C) One-fourth

(D) One-half

**Answer: A**

**249. In a riveted joint, when the number of rivets decreases from the inner most row to outer most row, the joint is said to be**

(A) Chain riveted

(B) Zig-zag riveted

(C) Diamond riveted

(D) None of these

**Answer: C**

**250. The polar modulus for a hollow shaft of outer diameter (D) and inner diameter (d) is**

- (A)  $(\pi/4) \times (D^2 - d^2)/D$
- (B)  $(\pi/16) \times (D^3 - d^3)/D$
- (C)  $(\pi/16) \times (D^4 - d^4)/D$
- (D)  $(\pi/32) \times (D^4 - d^4)/D$

**Answer: C**

**251. A leaf spring is supported at the**

- (A) Ends and loaded at the center
- (B) Center and loaded at the ends
- (C) Ends and loaded anywhere
- (D) Center and loaded anywhere

**Answer: B**

**252. The assumption made in the theory of the reinforced cement concrete beam is that**

- (A) All the tensile stresses are taken up by the steel reinforcement only
- (B) There is a sufficient bond between steel and concrete
- (C) The steel and concrete are stressed within its elastic limit
- (D) All of the above

**Answer: D**

**253. The ultimate tensile stress for mild steel is  
\_\_\_\_\_ the ultimate compressive stress.**

- (A) Equal to
- (B) Less than
- (C) More than
- (D) None of these

**Answer: C**

**254. The neutral axis of the cross-section of a beam is that axis at which the bending stress is**

- (A) Zero
- (B) Minimum
- (C) Maximum
- (D) Infinity

**Answer: A**

**255. When a thin cylindrical shell is subjected to an internal pressure, there will be**

- (A) A decrease in diameter and length of the shell
- (B) An increase in diameter and decrease in length of the shell
- (C) A decrease in diameter and increase in length of the shell
- (D) An increase in diameter and length of the shell

**Answer: D**

**256. When the shear force diagram is a parabolic curve between two points, it indicates that there is a**

- (A) Point load at the two points
- (B) No loading between the two points
- (C) Uniformly distributed load between the two points
- (D) Uniformly varying load between the two points

**Answer: D**

**257. In order to avoid sliding of masonry dam, the force of friction between the dam and soil should be at least  
\_\_\_\_\_ the total water pressure per meter length.**

- (A) Equal to
- (B) 1.5 times
- (C) Double
- (D) 2.5 times

**Answer: B**

**258. The design of thin cylindrical shells is based on**

- (A) Hoop stress
- (B) Longitudinal stress
- (C) Arithmetic mean of the hoop and the longitudinal stress
- (D) Geometric mean of the hoop and longitudinal stress

**Answer: A**

**259. A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane**

**at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The minimum normal stress will be**

(A) 400 MPa

(B) 500 MPa

(C) 900 MPa

(D) 1400 MPa

**Answer: A**

**260. In the below figure, the point C represents**

(A) Elastic limit

(B) Upper yield point

(C) Lower yield point

(D) Breaking point

**Answer: C**

**261. If the section modulus of a beam is increased, the bending stress in the beam will**

(A) Not change

(B) Increase

(C) Decrease

(D) None of these

**Answer: C**

**262. In the below figure, the point E represents.**

(A) The maximum stress

(B) The minimum stress

(C) No stress

(D) None of these

**Answer: A**

**263. The maximum deflection of a cantilever beam of length 'l' with a point load 'W' at the free end is**

(A)  $Wl^3/3EI$

(B)  $Wl^3/8EI$

(C)  $Wl^3/16EI$

(D)  $Wl^3/48EI$

**Answer: A**

**264. The strength of a riveted joint is equal to the**

(A) Pull required to tear off the plate per pitch length ( $P_t$ )

(B) Pull required to shear off the rivet per pitch length ( $P_s$ )

(C) Pull required to crush the rivet per pitch length ( $P_c$ )

(D) Minimum value of  $P_t$ ,  $P_s$  or  $P_c$

**Answer: D**

**265. The torsional rigidity of a shaft is given by**

(A)  $T/J$

(B)  $T/\theta$

(C)  $T/r$

(D)  $T/G$

**Answer: B**

**266. A localized compressive stress at the area of contact between two members is known as**

(A) Tensile stress

(B) Bending stress

(C) Crushing stress

(D) Shear stress

**Answer: C**

**267. The product of Young's modulus (E) and moment of inertia (I) is known as**

(A) Modulus of rigidity

(B) Bulk modulus

(C) Flexural rigidity

(D) Torsional rigidity

**Answer: C**

**268. A body is subjected to a direct tensile stress ( $\sigma$ ) in one plane. The shear stress is maximum at a section inclined at**

**to the normal of the section.**

- (A)  $45^\circ$  and  $90^\circ$
- (B)  $45^\circ$  and  $135^\circ$
- (C)  $60^\circ$  and  $150^\circ$
- (D)  $30^\circ$  and  $135^\circ$

**Answer: B**

**269. Two solid shafts 'A' and 'B' are made of the same material. The shaft 'A' is of 50 mm diameter and shaft 'B' is of 100 mm diameter. The strength of shaft 'B' is \_\_\_\_\_ as that of shaft A.**

- (A) One-half
- (B) Double
- (C) Four times
- (D) Eight times

**Answer: D**

**270. For a given stress, the ratio of moment of resistance of a beam of square cross-section when placed with its two sides horizontal to the moment of resistance with its diagonal horizontal, is**

- (A)  $1/2$
- (B) 1
- (C)  $1/\sqrt{2}$

(D)  $\sqrt{2}$

**Answer: D**

**271. The ductility of the material \_\_\_\_\_ with the decrease in percentage elongation of a specimen under tensile test.**

- (A) Increases
- (B) Decreases
- (C) Remain same
- (D) None of these

**Answer: B**

**272. The length of a conical bar is l, diameter of base is d and weight per unit volume is w. It is fixes at its upper end and hanging freely. The elongation of the bar under the action of its own weight will be**

- (A)  $wl^2/2E$
- (B)  $wl^2/4E$
- (C)  $wl^2/6E$
- (D)  $wl^2/8E$

**Answer: C**

**273. The ratio of linear stress to the linear strain is called**

- (A) Modulus of rigidity
- (B) Modulus of elasticity

(C) Bulk modulus

(D) Poisson's ratio

**Answer: B**

**274. For no tension condition in the base of a short column of circular section, the line of action of the load should be within a circle of diameter equal to \_\_\_\_\_ of the main circle.**

(A) One-half

(B) One-third

(C) One-fourth

(D) One-eighth

**Answer: C**

**275. The shear modulus of most materials with respect to the modulus of elasticity is**

(A) Equal to half

(B) Less than half

(C) More than half

(D) None of these

**Answer: B**

**276. Whenever a material is loaded within elastic limit, stress is \_\_\_\_\_ strain.**

(A) Equal to

- (B) Directly proportional to
- (C) Inversely proportional to
- (D) None of these

**Answer: B**

**277. In the below figure, Hook's law holds good, for the portion from \_\_\_\_\_.**

- (A) O to A
- (B) B to D
- (C) D to E
- (D) None of these

**278. The point of contraflexure occurs in**

- (A) Cantilever beams
- (B) Simply supported beams
- (C) Overhanging beams
- (D) Fixed beams

**Answer: C**

**279. The bending moment of a cantilever beam of length l and carrying a gradually varying load from zero at free end and w per unit length at the fixed end is \_\_\_\_\_ at the fixed end.**

- (A)  $wl/2$

(B)  $wl$

(C)  $wl^2/2$

(D)  $wl^2/6$

**Answer: D**

**280. The maximum deflection of a cantilever beam of length 'l' with a uniformly distributed load of 'w' per unit length is (where  $W = wl$ )**

(A)  $Wl^3/3EI$

(B)  $Wl^3/8EI$

(C)  $Wl^3/16EI$

(D)  $Wl^3/48EI$

**Answer: B**

**281. When a bar of length  $l$ , width  $b$  and thickness  $t$  is subjected to a pull of  $P$ , its**

(A) Length, width and thickness increases

(B) Length, width and thickness decreases

(C) Length increases, width and thickness decreases

(D) Length decreases, width and thickness increases

**Answer: C**

**282. A beam of T-section is subjected to a shear force of  $F$ . The maximum shear force will occur at the**

- (A) Top of the section
- (B) Bottom of the section
- (C) Neutral axis of the section
- (D) Junction of web and flange

**Answer: C**

**283. The maximum deflection of a fixed beam of length l carrying a central point load W is**

- (A)  $Wl^3/48 EI$
- (B)  $Wl^3/96 EI$
- (C)  $Wl^3/192 EI$
- (D)  $Wl^3/384 EI$

**Answer: C**

**284. The torque transmitted by a hollow shaft of outer diameter (D) and inner diameter (d) is**

- (A)  $(\pi/4) \times \tau [(D^2 - d^2)/d]$
- (B)  $(\pi/16) \times \tau [(D^3 - d^3)/d]$
- (C)  $(\pi/16) \times \tau [(D^4 - d^4)/d]$
- (D)  $(\pi/32) \times \tau [(D^4 - d^4)/d]$

**Answer: C**

**285. At the neutral axis of a beam**

(A) The layers are subjected to maximum bending stress

(B) The layers are subjected to minimum bending stress

(C) The layers are subjected to compression

(D) The layers do not undergo any strain

**Answer: D**

**286. In a thick cylindrical shell subjected to an internal pressure (p), the tangential stress across the thickness of a cylinder is**

(A) Maximum at the outer surface and minimum at the inner surface

(B) Maximum at the inner surface and minimum at the outer surface

(C) Maximum at the outer surface and zero at the inner surface

(D) Maximum at the inner surface and zero at the outer surface

**Answer: B**

**287. When a bar of length l, width b and thickness t is subjected to a push of P, its**

(A) Length, width and thickness increases

(B) Length, width and thickness decreases

(C) Length increases, width and thickness decreases

(D) Length decreases, width and thickness increases

**Answer: D**

**288. In a simple bending theory, one of the assumptions is that the plane sections before bending remain plane after bending. This assumption means that**

- (A) Stress is uniform throughout the beam
- (B) Strain is uniform throughout the beam
- (C) Stress is proportional to the distance from the neutral axis
- (D) Strain is proportional to the distance from the neutral axis

**Answer: D**

**289. For a beam, as shown in the below figure, the maximum deflection lies at**

- (A)  $l/3$  from B
- (B)  $l/3$  from A
- (C)  $\sqrt{l^2 - a^2/3}$  from B
- (D)  $\sqrt{l^2 - b^2/3}$  from A

**Answer: C**

**290. In the above question, the ratio of stiffness of spring 'B' to spring 'A' will be**

- (A) 2
- (B) 4
- (C) 6
- (D) 8

**Answer: D**

**291. When a body is subjected to a direct tensile stress ( $\sigma$ ) in one plane, then normal stress on an oblique section of the body inclined at an angle ' $\theta$ ' to the normal of the section is**

(A)  $\sigma \cos\theta$

(B)  $\sigma \cos^2\theta$

(C)  $\sigma \sin\theta$

(D)  $\sigma \sin^2\theta$

**Answer: B**

**292. The longitudinal stress in a riveted cylindrical shell of diameter (d), thickness (t) and subjected to an internal pressure (p) is**

(A)  $pd/(\eta \times t)$

(B)  $pd/(\eta \times 2t)$

(C)  $pd/(\eta \times 4t)$

(D)  $pd/(\eta \times 8t)$

**Answer: C**

**293. Lame's theory is associated with**

(A) Thin cylindrical shells

(B) Thick cylindrical shells

(C) Direct and bending stresses

(D) None of these

**Answer: B**

**294. According to Euler's column theory, the crippling load of a column is given by  $p = \pi^2 EI/Cl^2$ . In this equation, the value of 'C' for a column with both ends hinged, is**

(A)  $\frac{1}{4}$

(B)  $\frac{1}{2}$

(C) 1

(D) 2

**Answer: C**

**295. A riveted joint may fail by**

(A) Tearing of the plate at an edge

(B) Tearing of the plate across a row of rivets

(C) Shearing of rivets

(D) Any one of these

**Answer: D**

**296. The tensile strength of ductile materials is \_\_\_\_\_ its compressive strength.**

(A) Equal to

(B) Less than

(C) Greater than

(D) None of these

**Answer: C**

**297. The strain energy stored in a body due to shear stress, is (where  $\tau$  = Shear stress,  $C$  = Shear modulus, and  $V$  = Volume of the body)**

(A)  $(\tau/2C) \times V$

(B)  $2C/\tau V$

(C)  $(\tau^2/2C) \times V$

(D)  $2C/\tau^2 V$

**Answer: C**

**298. The maximum shear stress is \_\_\_\_\_ the algebraic difference of maximum and minimum normal stresses.**

(A) Equal to

(B) One-fourth

(C) One-half

(D) Twice

**Answer: C**

**299. The object of caulking in a riveted joint is to make the joint**

(A) Free from corrosion

(B) Stronger in tension

(C) Free from stresses

(D) Leak proof

**Answer: D**

**300. The Poisson's ratio for steel varies from**

(A) 0.23 to 0.27

(B) 0.27 to 0.30

(C) 0.31 to 0.34

(D) 0.32 to 0.42

**Answer: B**

**301. The shear force of a cantilever beam of length l and carrying a gradually varying load from zero at the free end and w per unit length at the fixed end is \_\_\_\_\_ at the fixed end.**

(A) Zero

(B)  $wl/4$

(C)  $wl/2$

(D)  $wl$

**Answer: C**

**302. The modulus of elasticity for mild steel is approximately equal to**

(A)  $10 \text{ kN/mm}^2$

(B) 80 kN/mm<sup>2</sup>

(C) 100 kN/mm<sup>2</sup>

(D) 210 kN/mm<sup>2</sup>

**Answer: D**

**303. The direct stress induced in a long column is \_\_\_\_\_ as compared to bending stress.**

(A) Same

(B) More

(C) Less

(D) Negligible

**Answer: D**

**304. For a 25 mm hole drilled in plates, the diameter of rivet shank should be**

(A) 23 mm

(B) 24.5 mm

(C) 25 mm

(D) 26 mm

**Answer: A**

**305. The elongation of a conical bar under its own weight is \_\_\_\_\_ that of prismatic bar of the same length.**

(A) Equal to

- (B) Half
- (C) One-third
- (D) Two-third

**Answer: C**

**306. A bolt is made to pass through a tube and both of them are tightly fitted with the help of washers and nuts. If the nut is tightened, then**

- (A) Bolt and tube are under tension
- (B) Bolt and tube are under compression
- (C) Bolt is under compression and tube is under tension
- (D) Bolt is under tension and tube is under compression

**Answer: D**

**307. Two shafts 'A' and 'B' have the same material. The shaft 'A' is solid of diameter 100 mm. The shaft 'B' is hollow with outer diameter 100 mm and inner diameter 50 mm. The torque transmitted by shaft 'B' is \_\_\_\_\_ as that of shaft 'A'.**

- (A) 1/6
- (B) 1/8
- (C) 1/4
- (D) 15/16

**Answer: D**

**308. Mohr's circle is used to determine the stresses on an oblique section of a body subjected to**

- (A) Direct tensile stress in one plane accompanied by a shear stress
- (B) Direct tensile stress in two mutually perpendicular directions
- (C) Direct tensile stress in two mutually perpendicular directions accompanied by a simple shear stress
- (D) All of the above

**Answer: D****309. A steel bar 2 m long, 20 mm wide and 10 mm thick is subjected to a pull of 2 kN. If the same bar is subjected to a push of 2 kN, the Poisson's ratio of the bar in tension will be \_\_\_\_\_ the Poisson's ratio for the bar in compression.**

- (A) Equal to
- (B) Less than
- (C) Greater than
- (D) None of these

**Answer: A****310. The assumption, generally, made in the theory of simple bending is that**

- (A) The beam material is perfectly homogeneous and isotropic
- (B) The beam material is stressed within its elastic limit
- (C) The plane sections before bending remain plane after bending

- (D) All of the above

**Answer: D**

**311. When a body is subjected to two equal and opposite pulls, as a result of which the body tends to extend its length, the stress and strain induced is**

- (A) Compressive stress, tensile strain
- (B) Tensile stress, compressive strain
- (C) Tensile stress, tensile strain
- (D) Compressive stress, compressive strain

**Answer: C**

**312. The thermal stress in a bar is \_\_\_\_\_ proportional to the change in temperature.**

- (A) Directly
- (B) Indirectly
- (C) Both A and B
- (D) None of these

**Answer: A**

**313. A body is subjected to a direct tensile stress of 300 MPa in one plane accompanied by a simple shear stress of 200 MPa. The minimum normal stress will be**

- (A) -100 MPa
- (B) 250 MPa

(C) 300 MPa

(D) 400 MPa

**Answer: A**

**314. For the beam shown in the below figure, the shear force at A is equal to**

(A)  $wl/6$

(B)  $wl/3$

(C)  $wl$

(D)  $2wl/3$

**Answer: B**

**315. The maximum shear stress developed in a beam of circular section is \_\_\_\_\_ the average shear stress.**

(A) Equal to

(B)  $4/3$  times

(C) 1.5 times

(D) Twice

**Answer: B**

**316. The bending moment of a cantilever beam of length l and carrying a uniformly distributed load of w per unit length is \_\_\_\_\_ at the free end.**

(A) Zero

(B)  $wl/4$

(C)  $wl/2$

(D)  $wl$

**Answer: A**

**317. For a shaft, the shear stress at a point is \_\_\_\_\_ the distance from the axis of the shaft.**

(A) Equal to

(B) Directly proportional to

(C) Inversely proportional to

(D) None of these

**Answer: B**

**318. The bending moment diagram for a simply supported beam carrying a uniformly distributed load of ' $w$ ' per unit length, will be**

(A) A horizontal line

(B) A vertical line

(C) An inclined line

(D) A parabolic curve

**Answer: D**

**319. When one plate overlaps the other and the two plates are riveted together with two rows of rivets, the joint is known as**

- (A) Single riveted lap joint
- (B) Double riveted lap joint
- (C) Double riveted single cover butt joint
- (D) Double riveted double cover butt joint

**Answer: B**

**320. When a body is subjected to a direct tensile stress ( $\sigma$ ) in one plane, the maximum shear stress is \_\_\_\_\_ the maximum normal stress.**

- (A) Equal to
- (B) One-half
- (C) Two-third
- (D) Twice

**Answer: B**

**321. The ductility of a material \_\_\_\_\_ with the increase in percentage reduction in area of a specimen under tensile test.**

- (A) Increases
- (B) Decreases
- (C) Remains same
- (D) None of these

**Answer: A**

**322. Rivets are generally specified by**

- (A) Thickness of plates to be joined
- (B) Overall length
- (C) Shank diameter
- (D) Diameter of head

**Answer: C**

**323. The simply supported beam 'A' of length 'l' carries a central point load 'W'. Another beam 'B' is loaded with a uniformly distributed load such that the total load on the beam is 'W'. The ratio of maximum deflections between beams 'A' and 'B' is**

- (A) 5/8
- (B) 8/5
- (C) 5/4
- (D) 4/5

**Answer: B**

**324. The rectangular beam 'A' has length 'l', width 'b' and depth 'd'. Another beam 'B' has the same length and depth but width is double that of 'A'. The elastic strength of beam 'B' will be \_\_\_\_\_ as compared to beam 'A'.**

- (A) Same
- (B) Double
- (C) Four times

(D) Six times

**Answer: B**

**325. The bending moment in the center of a simply supported beam carrying a uniformly distributed load of  $w$  per unit length is**

(A) Zero

(B)  $wl^2/2$

(C)  $wl^2/4$

(D)  $wl^2/8$

**Answer: D**

**326. The polar modulus for a solid shaft of diameter (D) is**

(A)  $\pi D^2/4$

(B)  $\pi D^3/16$

(C)  $\pi D^3/32$

(D)  $\pi D^4/64$

**Answer: B**

**327. The slenderness ratio is the ratio of**

(A) Area of column to least radius of gyration

(B) Length of column to least radius of gyration

(C) Least radius of gyration to area of column

(D) Least radius of gyration to length of column

**Answer: B**

**328.** A simply supported beam 'A' of length 'l', breadth 'b' and depth 'd' carries a central load 'W'. Another beam 'B' of the same dimensions carries a central load equal to  $2W$ . The deflection of beam 'B' will be \_\_\_\_\_ as that of beam 'A'.

(A) One-fourth

(B) One-half

(C) Double

(D) Four times

**Answer: C**

**329.** When a bar of length 'l' and diameter 'd' is rigidly fixed at the upper end and hanging freely, then the total elongation produced in the bar due to its own weight is (where  $w$  = Weight per unit volume of the bar)

(A)  $wl/2E$

(B)  $wl^2/2E$

(C)  $wl^3/2E$

(D)  $wl^4/2E$

**Answer: B**

**330.** In a riveted joint, when the rivets in the various rows are opposite to each other, the joint is said to be

- (A) Chain riveted
- (B) Zig-zag riveted
- (C) Diamond riveted
- (D) None of these

**Answer: A**

**331. When a rectangular bar of length l, breadth b and thickness t is subjected to an axial pull of P, then linear strain ( $\epsilon$ ) is given by (where E = Modulus of elasticity)**

- (A)  $\epsilon = P/b.t.E$
- (B)  $\epsilon = b.t.E/P$
- (C)  $\epsilon = b.t/P.E$
- (D)  $\epsilon = P.E/b.t$

**Answer: A**

**332. Which of the following statement is correct?**

- (A) The size of hole drilled in riveting plates is less than the actual size of rivet.
- (B) The center to center distance between two consecutive rivets in a row is called margin.
- (C) Rivets are generally specified by its shank diameter.
- (D) Tearing of plates can be avoided by taking the pitch of rivets equal to 1.5 times the diameter of rivet hole.

**Answer: C**

**333. A beam of triangular section is placed with its base horizontal. The maximum shear stress occurs at**

- (A) Apex of the triangle
- (B) Mid of the height
- (C) Center of gravity of the triangle
- (D) Base of the triangle

**Answer: B**

**334. The Young's modulus of a material is 125 GPa and Poisson's ratio is 0.25. The modulus of rigidity of me material is**

- (A) 30 GPa
- (B) 50 GPa
- (C) 80 GPa
- (D) 100 GPa

**Answer: B**

**335. In the above question, the normal stress on an oblique section will be maximum, when  $\theta$  is equal to**

- (A)  $0^\circ$
- (B)  $30^\circ$
- (C)  $45^\circ$
- (D)  $90^\circ$

**Answer: A**

**336. In a simply supported beam carrying a uniformly distributed load  $w$  per unit length, the point of contraflexure**

- (A) Lies in the center of the beam
- (B) Lies at the ends of the beam
- (C) Depends upon the length of beam
- (D) Does not exist

**Answer: D**

**337. In case of eccentrically loaded struts \_\_\_\_\_ is preferred.**

- (A) Solid section
- (B) Hollow section
- (C) Composite section
- (D) Reinforced section

**Answer: C**

**338. In a thin cylindrical shell subjected to an internal pressure  $p$ , the ratio of longitudinal stress to the hoop stress is**

- (A)  $1/2$
- (B)  $3/4$
- (C)  $1$

(D) 1.5

**Answer: A**

**339. The unit of modulus of elasticity is same as those of**

- (A) Stress, strain and pressure
- (B) Stress, force and modulus of rigidity
- (C) Strain, force and pressure
- (D) Stress, pressure and modulus of rigidity

**Answer: D**

**340. The stress at which the extension of the material takes place more quickly as compared to the increase in load, is called**

- (A) Elastic limit
- (B) Yield point
- (C) Ultimate point
- (D) Breaking point

**Answer: B**

**341. Two bars of different materials and same size are subjected to the same tensile force. If the bars have unit elongation in the ratio of 2:5, then the ratio of modulus of elasticity of the two materials will be**

- (A) 2 : 5
- (B) 5 : 2

(C) 4 : 3

(D) 3 : 4

**Answer: B**

**342. In a thick cylindrical shell subjected to an internal pressure (p), the maximum radial stress at the inner surface of the shell is**

(A) Zero

(B) p (tensile)

(C) -p (compressive)

(D) 2p (tensile)

**343. When a body is subjected to direct tensile stresses ( $\sigma_x$  and  $\sigma_y$ ) in two mutually perpendicular directions, accompanied by a simple shear stress  $\tau_{xy}$ , then in Mohr's circle method, the circle radius is taken as**

(A)  $[(\sigma_x - \sigma_y)/2] + \tau$

(B)  $[(\sigma_x + \sigma_y)/2] + \tau$

(C)  $(1/2) \times \sqrt{[(\sigma_x - \sigma_y)^2 + 4\tau^2_{xy}]}$

(D)  $(1/2) \times \sqrt{[(\sigma_x + \sigma_y)^2 + 4\tau^2_{xy}]}$

**Answer: C**

**344. A section of beam is said to be in pure bending, if it is subjected to**

(A) Constant bending moment and constant shear force

(B) Constant shear force and zero bending moment

(C) Constant bending moment and zero shear force

(D) None of the above

**Answer: C**

**345. Modular ratio of the two materials is the ratio of**

(A) Linear stress to linear strain

(B) Shear stress to shear strain

(C) Their modulus of elasticities

(D) Their modulus of rigidities

**Answer: C**

**346. The relation between modulus of elasticity (E) and modulus of rigidity (C) is given by**

(A)  $C = m \cdot E / 2(m + 1)$

(B)  $C = 2(m + 1) / m \cdot E$

(C)  $C = 2m \cdot E / (m + 1)$

(D)  $C = (m + 1) / 2m \cdot E$

**Answer: A**

**347. The Rankine's constant for a mild steel column with both ends hinged is**

(A)  $1/750$

(B)  $1/1600$

(C)  $1/7500$

(D)  $1/9000$

**Answer: C**

**348. In a watch, the spring is used to store strain energy. This energy is released**

(A) To stop the watch

(B) To run the watch

(C) To change the time

(D) All of these

**Answer: B**

**349. When a column is subjected to an eccentric load, the stress induced in the column will be**

(A) Direct stress only

(B) Bending stress only

(C) Shear stress only

(D) Direct and bending stress both

**Answer: D**

**350. Two shafts 'A' and 'B' are made of same material. The shaft 'A' is solid and has diameter D. The shaft 'B' is hollow with outer diameter D and inner diameter  $D/2$ . The**

**strength of hollow shaft in torsion is \_\_\_\_\_ as that of solid shaft.**

(A) 1/16

(B) 1/8

(C) 1/4

(D) 15/16

**Answer: D**

**351. A thick cylindrical shell having  $r_o$  and  $r_i$  as outer and inner radii, is subjected to an internal pressure ( $p$ ). The maximum tangential stress at the inner surface of the shell is**

(A)  $[p(r_o^2 + r_i^2)] / (r_o^2 - r_i^2)$

(B)  $[p(r_o^2 - r_i^2)] / (r_o^2 + r_i^2)$

(C)  $2\pi r_i^2 / (r_o^2 - r_i^2)$

(D)  $(r_o^2 - r_i^2) / 2\pi r_i^2$

**Answer: A**

**352. A beam of uniform strength has**

(A) Same cross-section throughout the beam

(B) Same bending stress at every section

(C) Same bending moment at every section

(D) Same shear stress at every section

**Answer: B**

**353. When a circular bar tapering uniformly from diameter  $d_1$ , at one end to diameter  $d_2$  at the other end, is subjected to an increase in temperature ( $t$ ), then the thermal stress induced is (where  $\alpha$  = Coefficient of linear expansion, and  $E$  = Modulus of elasticity for the bar material)**

- (A)  $\alpha \cdot t \cdot E \cdot d_1/d_2$
- (B)  $\alpha \cdot t \cdot d_1/E \cdot d_2$
- (C)  $\alpha \cdot t \cdot d_2/d_1 \cdot E$
- (D)  $d_1 \cdot t / \alpha \cdot E \cdot d_2$

**Answer: A**

**354. A shaft of diameter  $D$  is subjected to a twisting moment ( $T$ ) and a bending moment ( $M$ ). If the maximum bending stress is equal to maximum shear stress developed, then  $M$  is equal to**

- (A)  $T/2$
- (B)  $T$
- (C)  $2T$
- (D)  $4T$

**Answer: A**

**355. The maximum deflection of a fixed beam of length ' $l$ ' carrying a total load ' $W$ ' uniformly distributed over the whole length is**

- (A)  $Wl^3/48EI$

(B)  $Wl^3/96EI$

(C)  $Wl^3/192EI$

(D)  $Wl^3/384EI$

**Answer: D**

**356. Factor of safety is defined as the ratio of**

(A) Ultimate stress to working stress

(B) Working stress to ultimate stress

(C) Breaking stress to ultimate stress

(D) Ultimate stress to breaking stress

**Answer: A**

**357. A pressure vessel is said to be a thin shell when the ratio of wall thickness of the vessel to its diameter is**

1/10.

(A) Equal to

(B) Less than

(C) Greater than

(D) None of these

**Answer: B**

**358. The unit of stress in S.I. units is**

(A) N/mm<sup>2</sup>

- (B) kN/mm<sup>2</sup>
- (C) N/m<sup>2</sup>
- (D) Any one of these

**Answer: D**

**359. . A rod is enclosed centrally in a tube and the assembly is tightened by rigid washers. If the assembly is subjected to a compressive load, then**

- (A) Rod is under compression
- (B) Tube is under compression
- (C) Both rod and tube are under compression
- (D) Tube is under tension and rod is under compression

**Answer: C**

**360. The load required to produce a unit deflection in a spring is called**

- (A) Flexural rigidity
- (B) Torsional rigidity
- (C) Spring stiffness
- (D) Young's modulus

**Answer: C**

**361. The bending moment at a section tends to bend or deflect the beam and the internal stresses resist its bending.**

**The resistance offered by the internal stresses, to the bending, is called**

- (A) Compressive stress
- (B) Shear stress
- (C) Bending stress
- (D) Elastic modulus

**Answer: C**

**362. A thin cylindrical shell of diameter (d), length (l) and thickness (t) is subjected to an internal pressure (p). The hoop stress in the shell is**

- (A)  $pd/t$
- (B)  $pd/2t$
- (C)  $pd/4t$
- (D)  $pd/6t$

**Answer: B**

**363. Fatigue test is carried out for**

- (A) Stresses varying between two limits of equal value, but of opposite sign
- (B) Stresses varying between two limits of unequal value, but of opposite sign
- (C) Stresses varying between two limits of unequal value but of same sign

(D) All of the above

**Answer: D**

**364. The neutral axis of a beam is subjected to \_\_\_\_\_ stress.**

- (A) Zero
- (B) Maximum tensile
- (C) Minimum tensile
- (D) Maximum compressive

**Answer: A**

**365. Two beams, one of circular cross-section and the other of square cross-section, have equal areas of cross-sections. When these beams are subjected to bending,**

- (A) Both beams are equally economical
- (B) Square beam is more economical
- (C) Circular beam is more economical
- (D) None of these

**Answer: B**

**366. A body is subjected to two normal stresses  $20 \text{ kN/m}^2$  (tensile) and  $10 \text{ kN/m}^2$  (compressive) acting perpendicular to each other. The maximum shear stress is**

- (A)  $5 \text{ kN/m}^2$
- (B)  $10 \text{ kN/m}^2$

(C) 15 kN/m<sup>2</sup>

(D) 20 kN/m<sup>2</sup>

**Answer: C**

**367. The thermal or temperature stress is a function of**

(A) Increase in temperature

(B) Modulus of elasticity

(C) Coefficient of linear expansion

(D) All of these

**Answer: D**

**368. For long columns, the value of buckling load is  
\_\_\_\_\_ crushing load.**

(A) Equal to

(B) Less than

(C) More than

(D) None of these

**Answer: B**

**369. When a body is subjected to a direct tensile stress ( $\sigma$ ) in one plane, then tangential or shear stress on an oblique section of the body inclined at an angle ' $\theta$ ' to the normal of the section is**

(A)  $\sigma \sin 2\theta$

- (B)  $\sigma \cos 2\theta$
- (C)  $\sigma/2 \sin 2\theta$
- (D)  $\sigma/2 \cos 2\theta$

**Answer: C**

**370.** Whenever some external system of forces acts on a body, it undergoes some deformation. As the body undergoes some deformation, it sets up some resistance to the deformation. This resistance per unit area to deformation, is called

- (A) Strain
- (B) Stress
- (C) Pressure
- (D) Modulus of elasticity

**Answer: B**

**371.** According to Euler's column theory, the crippling load for a column of length (l) with one end fixed and the other end hinged, is

- (A)  $\pi^2 EI/l^2$
- (B)  $\pi^2 EI/4l^2$
- (C)  $2\pi^2 EI/l^2$
- (D)  $4\pi^2 EI/l^2$

**Answer: C**

**372. When there is a sudden increase or decrease in shear force diagram between any two points, it indicates that there is a**

- (A) Point load at the two points
- (B) No loading between the two points
- (C) Uniformly distributed load between the two points
- (D) Uniformly varying load between the two points

**Answer: A**

**373. According to Euler's column theory, the crippling load for a column of length (l) fixed at both ends is \_\_\_\_\_ the crippling load for a similar column hinged at both ends.**

- (A) Equal to
- (B) Two times
- (C) Four times
- (D) Eight times

**Answer: C**

**374. A load which is spread over a beam in such a manner that it varies uniformly over the whole length of a beam is called uniformly \_\_\_\_\_ load.**

- (A) Distributed
- (B) Varying
- (C) Both A and B

(D) None of these

**Answer: B**

**375. Which of the following statement is correct?**

- (A) A continuous beam has only two supports at the ends.
- (B) A uniformly distributed load spreads uniformly over the whole length of a beam.
- (C) The bending moment is maximum where shear force is maximum.
- (D) The maximum bending moment of a simply supported beam of length  $l$  with a central point load  $W$  is  $Wl/8$ .

**Answer: B**

**376. The shear force in the center of a simply supported beam carrying a uniformly distributed load of ' $w$ ' per unit length, is**

- (A) Zero
- (B)  $wl^2/2$
- (C)  $wl^2/4$
- (D)  $wl^2/8$

**Answer: A**

**377. Every direct stress is always accompanied by a strain in its own direction and an opposite kind of strain in every direction, at right angles to it. Such a strain is known as**

- (A) Linear strain

(B) Lateral strain

(C) Volumetric strain

(D) Shear strain

**Answer: B**

**378. A beam extending beyond the supports is called**

(A) Simply supported beam

(B) Fixed beam

(C) Overhanging beam

(D) Cantilever beam

**Answer: C**

**379. The shear force and bending moment are zero at the free end of a cantilever beam, if it carries a**

(A) Point load at the free end

(B) Point load at the middle of its length

(C) Uniformly distributed load over the whole length

(D) None of the above

**Answer: C**

**380. Compression members always tend to buckle in the direction of the**

(A) Axis of load

- (B) Perpendicular to the axis of load
- (C) Minimum cross section
- (D) Least radius of gyration

**Answer: D**

**381. In order to avoid tearing off the plate at an edge, the distance from the center of the rivet hole to the nearest edge of the plate (i.e. margin) should be (where  $d$  = Diameter of rivet hole in mm)**

- (A)  $d$
- (B)  $1.5 d$
- (C)  $2 d$
- (D)  $2.5 d$

**Answer: B**

**382. A thin cylindrical shell of diameter ( $d$ ) length ( $l$ ) and thickness ( $t$ ) is subjected to an internal pressure ( $p$ ). The longitudinal stress in the shell is**

- (A)  $pd/t$
- (B)  $pd/2t$
- (C)  $pd/4t$
- (D)  $pd/6t$

**Answer: C**

**383. The maximum shear stress developed in a beam of rectangular section is \_\_\_\_\_ the average shear stress.**

- (A) Equal to
- (B)  $4/3$  times
- (C) 1.5 times
- (D) Twice

**Answer: C**

**384. The distance between the center of a rivet hole to the nearest edge of plate, is called**

- (A) Margin
- (B) Pitch
- (C) Back pitch
- (D) Diagonal pitch

**Answer: A**

**385. When a rectangular beam is loaded transversely, the maximum tensile stress is developed on the**

- (A) Top layer
- (B) Bottom layer
- (C) Neutral axis
- (D) Every cross-section

**Answer: A**

**386. The strain energy stored in a body, when suddenly loaded, is \_\_\_\_\_ the strain energy stored when same load is applied gradually.**

- (A) Equal to
- (B) One-half
- (C) Twice
- (D) Four times

**Answer: D**

**387. The load at which the column just buckles, is known as**

- (A) Buckling load
- (B) Critical load
- (C) Crippling load
- (D) Any one of these

**Answer: D**

**388. The steel bars in a reinforced cement concrete beam are embedded \_\_\_\_\_ of the beam.**

- (A) In the center
- (B) Near the bottom
- (C) Near the top
- (D) At any position

**Answer: B**

**389. A reinforced cement concrete beam is considered to be made of**

- (A) Homogeneous material
- (B) Heterogeneous material
- (C) Composite material
- (D) Isotropic material

**Answer: B**

**390. Principle plane is a plane on which the shear stress is**

- (A) Zero
- (B) Minimum
- (C) Maximum
- (D) None of these

**Answer: A**

**391. The polar moment of inertia of a hollow shaft of outer diameter (D) and inner diameter (d) is**

- (A)  $\pi/16 (D^3 - d^3)$
- (B)  $\pi/16 (D^4 - d^4)$
- (C)  $\pi/32 (D^4 - d^4)$
- (D)  $\pi/64 (D^4 - d^4)$

**Answer: C****392. The springs in brakes and clutches are used to**

- (A) To apply forces
- (B) To measure forces
- (C) To store strain energy
- (D) To absorb shocks

**Answer: A****393. A beam encastered at both the ends is called**

- (A) Simply supported beam
- (B) Fixed beam
- (C) Cantilever beam
- (D) Continuous beam

**Answer: B****394. A spring used to absorb shocks and vibrations is**

- (A) Conical spring
- (B) Torsion spring
- (C) Leaf spring
- (D) Disc spring

**Answer: C**

**395. The bending moment at the free end of a cantilever beam is**

- (A) Zero
- (B) Minimum
- (C) Maximum
- (D) None of these

**Answer: A**

**396. The hoop stress in a thin cylindrical shell is**

- (A) Longitudinal stress
- (B) Compressive stress
- (C) Radial stress
- (D) Circumferential tensile stress

**Answer: D**

**397. In a stress-strain diagram as shown in the below figure, the curve 'A' represents**

- (A) Mild steel
- (B) Soft brass
- (C) Low carbon steel
- (D) Cold rolled steel

**Answer: B**

**398. The ratio of bulk modulus to Young's modulus for a Poisson's ratio of 0.25 will be**

(A) 1/3

(B) 2/3

(C) 1

(D) 3/2

**Answer: B**

**399. The ratio of shear modulus to the modulus of elasticity for a Poisson's ratio of 0.4 will be**

(A) 5/7

(B) 7/5

(C) 5/14

(D) 14/5

**Answer: C**

**400. A column of length (l) with both ends fixed may be considered as equivalent to a column of length \_\_\_\_\_ with one end fixed and the other end free.**

(A)  $l/8$

(B)  $l/4$

(C)  $l/2$

(D)  $l$

**Answer: B**

**401. The pull required to shear off a rivet, in double shear, per pitch length is**

(A)  $\pi/4 \times d^2 \times \sigma t$

(B)  $\pi/4 \times d^2 \times \tau$

(C)  $\pi/2 \times d^2 \times \sigma t$

(D)  $\pi/2 \times d^2 \times \tau$

**Answer: D**

**402. The bending stress in a beam is \_\_\_\_\_ bending moment.**

(A) Equal to

(B) Less than

(C) More than

(D) Directly proportional to

**Answer: D**

**403. When a change in length takes place, the strain is known as**

(A) Linear strain

(B) Lateral strain

(C) Volumetric strain

(D) Shear strain

**Answer: A****404. The volumetric strain is the ratio of the**

- (A) Original thickness to the change in thickness
- (B) Change in thickness to the original thickness
- (C) Original volume to the change in volume
- (D) Change in volume to the original volume

**Answer: D****405. A welded joint as compared to a riveted joint has  
\_\_\_\_\_ strength.**

- (A) Same
- (B) Less
- (C) More
- (D) None of these

**Answer: C****406. In a beam subjected to pure bending, the intensity of stress in any fibre is \_\_\_\_\_ the distance of the fibre from the neutral axis.**

- (A) Equal to
- (B) Less than
- (C) More than
- (D) Directly proportional to

**Answer: D**

**407. The relation between Young's modulus (E) and bulk modulus (K) is given by**

(A)  $k = (3m - 2)/m.E$

(B)  $k = m.E/(3m - 2)$

(C)  $k = 3(m - 2)/m.E$

(D)  $k = m.E/3(m - 2)$

**Answer: D**

**408. The shear force of a cantilever beam of length l carrying a uniformly distributed load of w per unit length is \_\_\_\_\_ at the fixed end.**

(A) Zero

(B)  $wl/4$

(C)  $wl/2$

(D)  $wl$

**Answer: D**

**409. The strength of the shaft is judged by the \_\_\_\_\_.**

(A) Torque transmitted by the shaft

(B) Length of the shaft

(C) Dia. of the shaft

(D) None of these

**Answer: A**

**410.** A simply supported beam 'A' of length  $l$ , breadth  $b$ , and depth  $d$  carries a central point load  $W$ . Another beam 'B' has the same length and depth but its breadth is doubled. The deflection of beam 'B' will be \_\_\_\_\_ as compared to beam 'A'.

(A) One-fourth

(B) One-half

(C) Double

(D) Four times

**Answer: B**

**411.** In a simple bending theory, one of the assumptions is that the material of the beam is isotropic. This assumption means that the

(A) Normal stress remains constant in all directions

(B) Normal stress varies linearly in the material

(C) Elastic constants are same in all the directions

(D) Elastic constants varies linearly in the material

**Answer: C**

**412.** The maximum deflection of a fixed beam carrying a central point load lies at

(A) Fixed ends

(B) Center of beam

(C)  $l/3$  from fixed ends

(D) None of these

**Answer: B**

**413. The shear stress at the center of a circular shaft under torsion is**

(A) Zero

(B) Minimum

(C) Maximum

(D) Infinity

**Answer: A**

**414. A body is subjected to a direct tensile stress of 300 MPa in one plane accompanied by a simple shear stress of 200 MPa. The maximum normal stress will be**

(A) -100 MPa

(B) 250 MPa

(C) 300 MPa

(D) 400 MPa

**Answer: D**

**415. When a closely-coiled helical spring is subjected to an axial load, it is said to be under**

(A) Bending

(B) Shear

(C) Torsion

(D) Crushing

**Answer: C**

**416. In a beam where shear force changes sign, the bending moment will be**

(A) Zero

(B) Minimum

(C) Maximum

(D) Infinity

**Answer: C**

**417. The strength of the unriveted or solid plate per pitch length is**

(A)  $d \cdot t \cdot \sigma_c$

(B)  $p \cdot t \cdot \sigma_t$

(C)  $(p - d) \cdot t \cdot \sigma_t$

(D)  $\pi/2 \times d^2 \times \tau$

**Answer: B**

**418. The tensile test is carried on \_\_\_\_\_ materials.**

- (A) Ductile
- (B) Brittle
- (C) Malleable
- (D) Plastic

**Answer: A**

**419. The bending moment diagram for a simply supported beam loaded in its center is**

- (A) A right angled triangle
- (B) An isosceles triangle
- (C) An equilateral triangle
- (D) A rectangle

**Answer: B**

**420. A bar of length 'L' meters extends by 'l' mm under a tensile force of 'P'. The strain produced in the bar is**

- (A)  $l/L$
- (B)  $0.1 l/L$
- (C)  $0.01 l/L$
- (D)  $0.001 l/L$

**Answer: D**

**421. A closely coiled helical spring is of mean diameter (D) and spring wire diameter (d). The spring index is the ratio**

**of**(A)  $1/d$ (B)  $1/D$ (C)  $D/d$ (D)  $d/D$ **Answer: C****422. The compression test is carried on \_\_\_\_\_ materials.**

(A) Ductile

(B) Brittle

(C) Malleable

(D) Plastic

**Answer: B****423. If the tearing efficiency of a riveted joint is 50%, then ratio of rivet hole diameter to the pitch of rivets is**

(A) 0.20

(B) 0.30

(C) 0.50

(D) 0.60

**Answer: C**

**424. The breaking stress is \_\_\_\_\_ the ultimate stress.**

- (A) Equal to
- (B) Less than
- (C) Greater than
- (D) None of these

**Answer: B**

**425. The section modulus (Z) of a beam is given by**

- (A)  $I/y$
- (B)  $I.y$
- (C)  $y/I$
- (D)  $M/I$

**Answer: A**

**426. The Rankine's formula holds good for**

- (A) Short columns
- (B) Long columns
- (C) Both short and long columns
- (D) Weak columns

**Answer: C**

**427. When two main plates are kept in alignment butting each other and riveted with cover plate on both sides of the main plates with two rows of rivets in each main plate, the joint is known as \_\_\_\_\_ double cover butt joint.**

- (A) Single riveted
- (B) Double riveted
- (C) Multi riveted
- (D) None of these

**Answer: B**

**428. When a shaft is subjected to a twisting moment, every cross-section of the shaft will be under**

- (A) Tensile stress
- (B) Compressive stress
- (C) Shear stress
- (D) Bending stress

**Answer: C**

**429. The maximum bending moment of a simply supported beam of span l and carrying a point load W at the center of beam, is**

- (A)  $Wl/4$
- (B)  $Wl/2$
- (C)  $Wl$

(D)  $Wl^2/4$

**Answer: A**

**430. A tensile test is performed on a mild steel round bar. Its diameter after fracture will**

- (A) Remain same
- (B) Increase
- (C) Decrease
- (D) Depend upon rate of loading

**Answer: C**

**431. Transverse fillet welds are designed for**

- (A) Tensile strength
- (B) Compressive strength
- (C) Shear strength
- (D) Bending strength

**Answer: A**

**432. The product of the tangential force acting on the shaft and its distance from the axis of the shaft (i.e. radius of shaft) is known as**

- (A) Bending moment
- (B) Twisting moment
- (C) Torsional rigidity

(D) Flexural rigidity

**Answer: B**

**433. The unit of strain is**

(A) N-mm

(B) N/mm

(C) mm

(D) No unit

**Answer: D**

**434. In spring balances, the spring is used**

(A) To apply forces

(B) To measure forces

(C) To absorb shocks

(D) To store strain energy

**Answer: B**

**435. A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The maximum shear stress will be**

(A) 400 MPa

(B) 500 MPa

(C) 900 MPa

(D) 1400 MPa

**Answer: B**

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