062/2024

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. Which of the following is not an elastic material?

(A) Neoprene (B) Nylon

(C) Celluloid (D) Resilin

2. Find the thermoplastic material from the following :

(A) Polystyrenes (B) Polyurethane

(C) Phenolformaldehyde resins (D) Polyimide

3. 1 kgf = _____ N

(A) 98.1 (B) 1000

(C) 100 (D) 9.81

4. The internal opposite force to external load per unit area is known as :

(A) Strain (B) Stress

(C) Tensile force (D) Compressive force

5. The property by virtue of which certain materials return back to their original position after the removal of external force is :

(A) Plasticity (B) Elasticity

(C) Tenacity (D) Toughness

6. What is the unit of Young's modulus?

(A) N/mm^2 (B) No unit

(C) N (D) None of these

7. Which law states the relationship between stress and strain?

(A) Newton's law (B) Joule's law

(C) Hooke's law (D) Pascal's law

8. In stress-strain curve after which point the straight line relation between stress and strain ceases :

(A) Elastic limit (B) Yield point

(C) Maximum stress (D) Breaking point

9. The unit of strain is :

(A) N (B) N/mm^2

(C) No unit (D) None of these

10. The ratio between change in dimension to the original dimension is called :

(A) Stress (B) Young's modulus

(C) Poisson's ratio (D) Strain

11. The ratio between lateral strain and linear strain is :

(A) Poisson's ratio (B) Volumetric stress

(C) Bulk modulus (D) Modulus of rigidity

12. The minimum load at which a material develops failure is called :

(A) Compressive load (B) Tensile load

(C) Breaking load (D) Ultimate load

13. The ratio between the change in length to original length is :

(A) Volumetric strain (B) Tensile stress

(C) Linear strain (D) Lateral strain

14. Which elastic constant is denoted by the letter "K"?

(A) Shear stress (B) Bulk modulus

(C) Modulus of rigidity (D) Young's modulus

15. The ratio between change in volume of material to its original volume is :

(A) Volumetric strain (B) Bulk modulus

(C) Modulus of rigidity (D) Modulus of elasticity

16. The elastic constants are

(i) Modulus of rigidity
(ii) Factor of safety
(iii) Bulk modulus
(iv) Young's modulus

(A) Only (i) (B) Only (i) and (ii)

(C) Only (i), (ii) and (iii) (D) Only (i), (iii) and (iv)

17. Shear stress = _____ × shear strain.

(A) Young's modulus (B) Bulk modulus

(C) Poisson's ratio (D) Modulus of rigidity

18. The unit of Poisson's ratio is :

(A) N (B) N/mm^2

(C) No unit (D) None of these

19. Shear stress/Shear strain =

(A) N (B) E

(C) K (D) e

20. Which of the following has the same unit of modulus of rigidity?

(A) Poisson's ratio (B) Young's modulus

(C) Strain (D) Factor of safety

21. Which of the following statement is/are correct about strain energy?

(i) It is the potential energy stored by an elastic body when deformed.

(ii) A compressed spring possesses strain energy.

(A) Only (i) (B) Only (ii)

(C) All of the above (i) and (ii) (D) Both (i) and (ii) are not correct

22. Which of the following statement is/are correct about Strain energy?

(i) Strain energy stored is due to gradually applied load

(ii) Strain energy stored is due to suddenly applied load

(iii) Strain energy stored is due to load with an impact

(A) Only (i) (B) Only (ii)

(C) All of the above (i), (ii) and (iii) (D) Only (i) and (ii)

23. The total strain energy stored in a body is known as :

(A) Stress (B) Resilience

(C) Proof resilience (D) None of these

24. The maximum strain energy stored in a body is known as :

(A) Stress (B) Resilience

(C) Proof resilience (D) None of these

25. Which of the following statement is/are correct about Proof resilience?

(i) It is the capacity of a strained body for doing work on the removal of the straining force.

(ii) It is the quantity of strain energy stored in a body when strained upto elastic limit.

(iii) It is the Resilience of a material per unit volume.

(A) Only (i) (B) All of the above (i), (ii) and (iii)

(C) Only (i) and (ii) (D) Only (ii)

26. Which of the following statement is/are correct about Modulus of resilience?

(i) It is the capacity of a strained body for doing work on the removal of the straining force.

(ii) It is the quantity of strain energy stored in a body when strained upto elastic limit.

(iii) It is the proof Resilience of a material per unit volume.

(A) Only (i) (B) Only (ii)

(C) Only (iii) (D) All of the above (i), (ii) and (iii)

27. In which types of loading the load is constant throughout the process of the deformation of the body?

(A) Gradually applied load (B) Suddenly applied load

(C) Load with impact (D) None of these

28. The capacity of a strained body for doing work on the removal of the straining force is known as :

(A) Stress (B) Resilience

(C) Proof resilience (D) None of these

29. Which of the following statement is/are correct about types of loading?

(i) The maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually.

(ii) The extension produced in a rod due to impact load is very small in comparison with the height through which the load falls.

(iii) In gradually applied loading the load is constant throughout the process of the deformation of the body.

(A) Only (i) and (iii) (B) Only (ii) and (iii)

(C) Only (i) and (ii) (D) All of the above (i), (ii) and (iii)

30. Which one of the following is correct for proof resilience?

(A) $(\sigma * \text{volume})/2E$ (B) $2E/(\sigma^2 * \text{volume})$

(C) $(\sigma * \text{volume}^2)/2E$ (D) $(\sigma^2 * \text{volume})/2E$

31. Which of the following statement is/are correct about centre of gravity of a rectangle?

(i) It is at the point where its diagonals meet each other.

(ii) It is a middle point of the length as well as the breadth of the rectangle.

(A) Only (i) (B) Only (ii)

(C) Both (i) and (ii) (D) None of the above

32. What is the centre of gravity of a triangle?

(A) It is the point where the three medians of triangle meet

(B) 1/3 of its height

(C) 1/2 of its height

(D) None of these

33. What is the centre of gravity of a semi circle?

(A) at a distance ($r/3\pi$) of from its base measured along vertical radius

(B) at a distance ($4r/3\pi$) of from its base measured along vertical radius

(C) at a distance ($4r/\pi$) of from its base measured along vertical radius

(D) at a distance ($r/4\pi$) of from its base measured along vertical radius

34. Which of the following statement is/are correct about centre of gravity?

(i) The centre of gravity of a circle is its centre.

(ii) The centre of gravity of a right circular cone is at a 1/3 distance of from its base.

(iii) The centre of gravity of a right circular cone is at a 1/4 distance of from its base.

(A) Only (i) and (ii)

(B) Only (ii) and (iii)

(C) Only (i) and (iii)

(D) All of the above (i), (ii) and (iii)

35. Which of the following statement is/are correct about moment of inertia?

(i) The moment of the moment of a force is called as moment of inertia.

(ii) Unit of moment of inertia is m^4.

(iii) Routh's rule is used to find out moment of inertia.

(A) Only (i)

(B) Only (ii)

(C) Only (i) and (ii)

(D) All of the above (i), (ii) and (iii)

36. The centre of gravity of an equilateral triangle with each side (a) is _____ from any of the three sides.

(A) $(a\sqrt{3})/2$

(B) $(a\sqrt{2})/3$

(C) $2/(a\sqrt{3})$

(D) $(a/2\sqrt{3})$

37. Which one of the following is moment of inertia of a rectangular section?

(A) $bd^3/12$

(B) $bd^2/12$

(C) $bd^3/6$

(D) $bd^2/6$

38. The theorem of perpendicular axis is used for obtaining the moment of inertia of :

(A) Square lamina

(B) Rectangular lamina

(C) Triangular lamina

(D) Circular lamina

39. Which of the following statement is/are correct about the Parallel axis theorem?

(i) Used for obtaining the moment of inertia of circular lamina.
(ii) Used for obtaining the moment of inertia of semi circular lamina.
(iii) Used for obtaining the moment of inertia of square lamina.

(A) Only (i)
(B) Only (ii)
(C) Only (iii)
(D) All of the above (i), (ii) and (iii)

40. The moment of inertia of a circular section of diameter (d) is :

(A) $\pi d^3/64$
(B) $\pi d^4/64$
(C) $\pi d^4/32$
(D) None of the above

41. What object is used to design to support the roof covering or ceiling over long spans thereby avoiding the intermediate column?

(A) Fink truss
(B) Fan truss
(C) Pratt truss
(D) All of the above

42. Which member carries mainly tensile force?

(A) Beams
(B) Plates
(C) Torsion member
(D) Tension member

43. When vertical supports of circular cross section and of approximately cylindrical form, it is known as :

(A) Column
(B) Beam
(C) Span
(D) Wire rope

44. What is the name of the structure in which components such as beam, column and footing are monolithic in design and construction?

(A) Rigid frame
(B) Non-portal frame
(C) Portal frame
(D) Gabled frame

45. What are the components of plate griders given below?

(i) Web plate
(ii) Flange plate
(iii) Flange spice
(iv) Lintel

(A) (iii) and (iv)
(B) (ii) and (iv)
(C) (i), (ii) and (iii)
(D) (i) and (iv)

46. What is the advantage of cold former steel members over reinforced concrete?

(A) Economical

(B) Termite – proof and rot proof

(C) Shrinking and creeping at temperature

(D) Less accurate detailing

47. A structural member which primarily transmits a compressive force is called :

(A) Beam (B) Column

(C) Rivet (D) None of these

48. What is the main advantage of Structural Steel?

(A) Maintenance cost (B) Slowly erection

(C) Fire proofing cost (D) High strength

49. What is the minimum distance between centres of any two adjacent rivet hole to the nominal diameter of the rivet?

(A) 1.00 times (B) 1.50 times

(C) 2.00 times (D) 2.50 times

50. Which span the plate griders are used?

(A) More than 5 m (B) More than 20 m

(C) More than 15 m (D) More than 10 m

51. The structural member which is acted upon by a system of external loads at right angles to the axis is :

(A) Beam (B) Point load

(C) Distributed load (D) Column

52. In a simply supported beam, bending moment at supports is always :

(A) Negative (B) Zero

(C) Positive (D) None of these

53. For a simply supported beam, loaded with point load the B.M. diagram will be :

(A) Triangle (B) A parabolic curve

(C) A Cubic Curve (D) Rectangle

54. The B.M diagram for a cantilever with point load at the free end will be :

(A) A triangle with maximum height under free end

(B) A triangle with maximum height under fixed end

(C) A parabolic curve

(D) An ellipse

55. For a simply supported beam of span 'l' loaded with uniformly distributed load w/m over the whole span the maximum B.M will be :

(A) $wl/4$ (B) $wl^2/8$

(C) $wl^2/4$ (D) $wl^2/2$

56. At the point of contraflexure :

(A) B.M is minimum (B) B.M is Maximum

(C) B.M is either zero or changes sign (D) None of these

57. Name the type of beam whose one end is fixed and the other end free:

(A) Cantilever beam (B) Simply supported beam

(C) Over hanging beam (D) Fixed beam

58. A bending moment causing concavity upwards will be taken as:

(A) Positive (B) Negative

(C) Zero (D) None of these

59. What is the shape of the bending moment diagram over the length of the beam carrying a uniformly distributed load?

(A) Parabolic (B) Linear

(C) Circular (D) Cubical

60. Which type of beam freely supported at two points has one or both ends extending beyond these supports?

(A) Cantilever beam (B) Fixed beam

(C) Overhanging beam (D) Simply supported beam

61. Which type of column is likely to fail due to buckling rather than material yielding?

(A) Intermediate column (B) Long column

(C) Short column (D) Thick column

62. A column with a length-to-radius of gyration ration (L/r) less than a certain critical value is considered :

(A) Intermediate (B) Long

(C) Short (D) Slender

63. Which type of column failure occurs due to excessive axial compression?

(A) Buckling (B) Yielding

(C) Torsion (D) Shear

64. According to Euler's formula, the critical buckling load of a column is inversely proportional to the :

(A) Cross-sectional area of the column
(B) Density of the column material
(C) Length of the column
(D) Modulus of elasticity of the column material

65. Which property of the column is used to calculate the radius of gyration in Euler's formula?

(A) Moment of inertia
(B) Poisson's ratio
(C) Yield strength
(D) Young's modulus

66. What does an effective length factor of 0.5 signify for a column?

(A) Both ends are fixed
(B) Both ends are free
(C) One end is fixed, and the other end is free
(D) One end is fixed, and the other end is pinned

67. Which type of column will typically have the smallest effective length factor?

(A) Fixed-fixed
(B) Hinged-fixed
(C) Fixed-ended
(D) Hinged-hinged

68. Which factor does not affect the slenderness ratio of a column?

(A) Length
(B) Cross-sectional area
(C) Material strength
(D) Load applied

69. Rankine's formula is commonly applied in the field of :

(A) Aerospace engineering
(B) Chemical engineering
(C) Structural engineering
(D) Electrical engineering

70. Johnson's formula is based on the assumption that materials :

(A) Deform plastically under load
(B) Exhibit linear elasticity
(C) Have isotropic properties
(D) Remain within the elastic limit

71. What unit is typically used to measure beam deflection?

(A) Newton (N)
(B) Meter (m)
(C) Pascal (Pa)
(D) Millimeter (mm)

72. In cantilever beams, the deflection is zero at

(A) At supports
(B) Fixed end
(C) Free end
(D) Through out

73. Which of the following is a common method for connecting the different materials in a composite beam?

(A) Welding
(B) Bolting
(C) Adhesive bonding
(D) Riveting

74. Which theory is commonly used to analyze the behaviour of composite beams subjected to bending?

(A) Hooke's law
(B) Mohr's circle
(C) Euler-Bernoulli beam theory
(D) Timoshenko beam theory

75. In a fixed beam, the rotation at the support is :

(A) Indeterminate
(B) Permitted
(C) Restricted
(D) Zero

76. The deflection of a fixed beam is maximum at :

(A) Center
(B) Support
(C) Quarter-span
(D) Midspan

77. Continuous beams are characterized by having :

(A) Fixed supports at both ends
(B) Multiple supports along their length
(C) Single support at each end
(D) Uniform load distribution

78. The curvature of a continuous beam is

(A) Constant
(B) Linearly varying
(C) Maximum at midspan
(D) Zero

79. Which material property primarily affects the deflection of a beam?

(A) Yield strength
(B) Thermal conductivity
(C) Elastic modulus
(D) Density

80. For a cantilever beam subjected to a uniformly distributed load, where is the maximum deflection usually located?

(A) At the point of maximum load
(B) At the midspan
(C) At the free end
(D) At the fixed end

81. The hollow shaft will transmit greater _____ than the solid shaft of the same weight.

(A) Sectional modulus
(B) Torque
(C) Bending moment
(D) Shear stress

82. The moment of inertia of a plane area with respect to an axis _____ to the plane is called polar moment of inertia.

(A) Perpendicular (B) Parallel
(C) Equal (D) Opposite

83. The power transmitted by shaft in SI system is given by :

(A) $3\pi NT/60$ (B) $2\pi NT/50$
(C) $2\pi NT/60$ (D) $2\pi NT/30$

84. _____ is a measure of the strength of shaft on rotation.

(A) Torsional rigidity (B) Torsional modulus
(C) Sectional modulus (D) Polar modulus

85. A closed coil helical spring is cut into two equal parts. The stiffness of each resulting spring as compared to the original spring will be :

(A) double (B) same
(C) ¼ (D) ½

86. The ratio of polar moment of inertia to the radius of the shaft is known as :

(A) Flexural rigidity (B) Shaft stiffness
(C) Torsional section modulus (D) Torsional rigidity

87. A spring of stiffness constraint K is cut into two equal parts. The stiffness constant of new spring will be :

(A) K/2 (B) 2K
(C) 3K (D) K/3

88. Which of the following function can be the spring perform?

(A) Store energy (B) Measure force
(C) Absorb shock (D) All of the above

89. When two dissimilar shafts are connected together, then the shaft is :

(A) Composite shafts (B) Differential shafts
(C) Combined shafts (D) Integrated shafts

90. When a shaft subjected to pure twisting, then the type of stress developed is :

(A) Normal (B) Axial
(C) Shear (D) Bending

91. Bending test are conducted to ensure that the material has enough :

(A) impact (B) ductility
(C) force (D) hardness

92. Which ferrous metal doesn't show fatigue limit?

(A) Austenitic stainless steel (B) Cast iron

(C) Wrought iron (D) Low carbon steel

93. What is the v notch angle found on an impact testing machine?

(A) 60° (B) 90°

(C) 45° (D) 30°

94. Compression test is done on which of the following materials?

(A) Aluminium (B) Gold

(C) Silver (D) Cast iron

95. Brinell number of a material or an alloy is a measure of its :

(A) hardness (B) tensile strength

(C) toughness (D) malleability

96. The direct shear test can also be called as :

(A) strain controlled shear box test (B) simple shear test

(C) stress test (D) All of the above

97. Pick the odd one out

(A) Resilience (B) Endurance limit

(C) Elastic strength (D) Stiffness

98. Fatigue curves are popularly known as :

(A) R (B) S

(C) S-N (D) N

99. Percentage elongation during tensile test is indicative of :

(A) Malleability (B) Elasticity of the metal

(C) Creep (D) Ductility

100. Shearing resistance can be determined in the laboratory by _____ methods.

(A) 4 (B) 5

(C) 2 (D) 3

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