Strength of Materials

1. What is the primary focus of Strength of Materials?

(A) Thermal properties

(B) Stress and strain analysis

(C) Material composition

(D) Fluid dynamics

Answer: B) Stress and strain analysis

2. What is tensile stress?

(A) The ratio of original length to the change in length

(B) The ratio of change in length to the tensile force applied

(C) The ratio of tensile force to the change in length

(D) The ratio of change in length to the original length

Answer: D) The ratio of change in length to the original length

3. A rod 200 cm long is subjected to an axial pull due to which it elongates about 2 mm. Calculate the amount of strain?

(A) 0.01

(B) 0.002

(C) 0.01

(D) 0.001

Answer: D) 0.001

4. The property by which a material returns to its original shape after removal of force is:

(A) Plasticity

(B) Elasticity

(C) Malleability

(D) Ductility

Answer: B) Elasticity

5. Which of the following is a brittle material?

(A) Mild steel

(B) Wrought iron

(C) Cast iron

(D) Copper

Answer: C) Cast iron

6. Maximum strain energy that can be stored in a body is known as:

(A) Impact energy

(B) Resilience

(C) Proof resilience

(D) Modulus of resilience

Answer: C) Proof resilience

7. The total strain energy stored in a body is termed as:

(A) Resilience

(B) Proof resilience

(C) Modulus of resilience

(D) Toughness

Answer: A) Resilience

8. The stress induced in a body due to a suddenly applied load compared to gradually applied load is:

(A) Same

(B) Half

(C) Two times

(D) Four times

Answer: C) Two times

9. The strain energy stored in a body due to suddenly applied load compared to gradually applied load is:

(A) Same

(B) Twice

(C) Four times

(D) Eight times

Answer: C) Four times

10. Poisson's ratio is defined as:

(A) Lateral strain / Longitudinal strain

(B) Longitudinal strain / Lateral strain

(C) Change in length / Original length

(D) Stress / Strain

Answer: A) Lateral strain / Longitudinal strain

11. The unit of modulus of elasticity is:

(A) N

(B) N/m

(C) N/m^2

(D) J

Answer: C) N/m^2

12. Young's modulus is the ratio of:

(A) Stress to strain

(B) Strain to stress

(C) Force to elongation

(D) Load to area

Answer: A) Stress to strain

13. The maximum load a wire can carry without deformation is called:

(A) Elastic limit

(B) Yield point

(C) Breaking point

(D) Ultimate point

Answer: A) Elastic limit

14. Which law relates stress to strain within the elastic limit?

(A) Pascal’s Law

(B) Hooke’s Law

(C) Newton’s Law

(D) Boyle’s Law

Answer: B) Hooke’s Law

15. The strain energy per unit volume at elastic limit is called:

(A) Toughness

(B) Modulus of resilience

(C) Proof resilience

(D) Yield strength

Answer: B) Modulus of resilience

16. The total elongation of a bar under its own weight is:

(A) Zero

(B) Maximum

(C) Minimum

(D) Infinity

Answer: B) Maximum

17. The area under the stress-strain curve gives:

(A) Strain energy

(B) Stiffness

(C) Toughness

(D) Ductility

Answer: C) Toughness

18. Brittle materials fail at:

(A) Maximum shear stress (B)

Principal normal stress

(C) Minimum stress

(D) Average stress

Answer: B) Principal normal stress

19. In a tensile test, “necking” occurs at:

(A) Proportional limit

(B) Elastic limit

(C) Ultimate point

(D) Yield point

Answer: C) Ultimate point

20. Creep is:

(A) Plastic deformation at high temperature

(B) Sudden fracture under load

(C) Increase in strain at constant stress over time

(D) Decrease in strain at constant stress

Answer: C) Increase in strain at constant stress over time

21. What is the relation between load and elongation at elastic limit?

(A) Directly proportional

(B) Inversely proportional

(C) No relation

(D) Varies randomly

Answer: A) Directly proportional

22. Modulus of rigidity is related to:

(A) Shear stress and shear strain

(B) Tensile stress and tensile strain

(C) Bulk stress and bulk strain

(D) Compressive stress and compressive strain

Answer: A) Shear stress and shear strain

23. Bulk modulus relates to change in:

(A) Length

(B) Area

(C) Volume

(D) Shape

Answer: C) Volume

24. The ratio of stress to strain is called:

(A) Modulus of elasticity

(B) Modulus of rigidity

(C) Bulk modulus

(D) Poisson’s ratio

Answer: A) Modulus of elasticity

25. If Poisson’s ratio is zero, material is:

(A) Completely elastic

(B) Rigid

(C) Compressible but does not contract laterally

(D) Fluid

Answer: C) Compressible but does not contract laterally

26. If stress is doubled, strain will be:

(A) Halved

(B) Doubled

(C) Same

(D) Zero

Answer: B) Doubled

27. The slope of stress-strain curve in elastic region is:

(A) Young's modulus

(B) Modulus of rigidity

(C) Bulk modulus

(D) Toughness

Answer: A) Young's modulus

28. Permanent deformation after removing load is called:

(A) Elastic deformation (B)

Plastic deformation

(C) Shear deformation

(D) None of these

Answer: B) Plastic deformation

29. The rupture of material occurs at:

(A) Elastic limit

(B) Yield point

(C) Ultimate point

(D) Breaking point

Answer: D) Breaking point

30. The modulus of elasticity for mild steel is approximately:

(A) 2×10^{11} N/m²

(B) 2×10^{9} N/m² (C) 2×10^{8} N/m²

(D) 2×10^{12} N/m²

Answer: A) 2×10^{11} N/m²

31. A material with higher yield point is:

(A) More ductile

(B) More brittle

(C) Stronger

(D) Weaker

Answer: C) Stronger

32. Which value is always less than ultimate tensile strength?

(A) Breaking strength

(B) Yield strength

(C) Elastic limit

(D) Poisson’s ratio

Answer: B) Yield strength

33. Shear stress acts tangentially while normal stress acts:

(A) Perpendicularly

(B) Tangentially

(C) At 45°

(D) At any angle

Answer: A) Perpendicularly

34. The ultimate tensile strength of a material is the maximum:

(A) Load at fracture

(B) Stress at elastic limit

(C) Stress at yield

(D) Stress at breaking point

Answer: D) Stress at breaking point

35. A ductile material is preferable for:

(A) Bridges

(B) Gears

(C) Machine shafts

(D) All of these

Answer: D) All of these

36. The material with maximum modulus of elasticity is:

(A) Rubber

(B) Mild steel

(C) Aluminum

(D) Copper

Answer: B) Mild steel

37. Which value for Poisson's ratio is not possible?

(A) 0

(B) 0.25

(C) 0.5

(D) 1

Answer: D) 1

38. The resistance to fracture is called:

(A) Toughness

(B) Hardness

(C) Elasticity

(D) Ductility

Answer: A) Toughness

39. In a stress-strain diagram, permanent set starts at:

(A) Proportional limit

(B) Elastic limit

(C) Yield point

(D) Ultimate point

Answer: B) Elastic limit

40. The shear modulus is denoted by:

(A) E

(B) G

(C) K

(D) v

Answer: B) G

41. Unit of strain is:

(A) N/m^2

(B) Pa

(C) Dimensionless

(D) N/m

Answer: C) Dimensionless

42. The factor of safety is:

(A) Ultimate stress/Working stress (B)

Yield stress/Ultimate stress

(C) Working stress/Ultimate stress

(D) Elastic limit/Yield stress

Answer: A) Ultimate stress/Working stress

43. The value of Poisson's ratio for steel is:

(A) 0.5

(B) 0.33

(C) 0.2

(D) 0

Answer: B) 0.33

44. True stress is load divided by:

(A) Original area

(B) Actual area at instant

(C) Breaking area

(D) Yield area

Answer: B) Actual area at instant

45. For brittle materials, ultimate strength is almost equal to:

(A) Elastic limit

(B) Yield strength

(C) Breaking strength

(D) Toughness

Answer: C) Breaking strength

46. The elongation of a bar under a given load will be minimum for:

(A) Long and thin bar

(B) Short and thick bar

(C) Both same

(D) Depends on material

Answer: B) Short and thick bar

47. For a prismatic bar, total extension is proportional to:

(A) Load and length

(B) Area and length

(C) Load and area

(D) Modulus and area

Answer: A) Load and length

48. The strain produced in a bar by a stress is inversely proportional to:

(A) Length

(B) Modulus of elasticity

(C) Area

(D) Load

Answer: B) Modulus of elasticity

49. The maximum stress induced in a body is proportional to:

(A) Area

(B) Load/Area

(C) Modulus

(D) Length

Answer: B) Load/Area

50. The load corresponding to the proportional limit is known as:

(A) Safe load

(B) Proof load

(C) Ultimate load

(D) Yield load

Answer: B) Proof load

51. The stress at proportional limit is called:

(A) Proof stress

(B) Yield stress

(C) Ultimate stress

(D) Breaking stress

Answer: A) Proof stress

52. If proportional limit is exceeded, Hooke's law is:

(A) Valid

(B) Not valid (C) Modified

(D) None

Answer: B) Not valid

53. The total strain energy stored in a loaded specimen is called: (A) Modulus of resilience

(B) Proof resilience

(C) Toughness

(D) Fatigue

Answer: B) Proof resilience

54. If stress is at elastic limit, strain energy stored is:

(A) Modulus of resilience

(B) Proof resilience

(C) Total resilience

(D) Breaking resilience

Answer: A) Modulus of resilience

55. The graph of stress vs. strain up to the elastic limit is:

(A) Straight line

(B) Curve

(C) Hyperbola

(D) Circle

Answer: A) Straight line

56. Stress acting tangentially is called:

(A) Shear stress

(B) Normal stress

(C) Bulk stress

(D) Elastic stress

Answer: A) Shear stress

57. Fatigue failure occurs due to:

(A) Sudden load (B)

Varying load

(C) Static load

(D) Temperature

Answer: B) Varying load

58. Hardness of material is measured by:

(A) Impact test

(B) Brinell test

(C) Tensile test

(D) Fatigue test

Answer: B) Brinell test

59. The maximum strain energy per unit volume is:

(A) Modulus of resilience

(B) Proof resilience

(C) Toughness

(D) Elasticity

Answer: A) Modulus of resilience

60. Endurance limit refers to:

(A) Fatigue strength

(B) Ultimate strength (C) Proportional limit

(D) Yield strength

Answer: A) Fatigue strength

61. If working stress is doubled, factor of safety will:

(A) Remain same

(B) Halve

(C) Double

(D) Zero

Answer: B) Halve

62. Stress produced by twisting force in shaft is:

(A) Compressive

(B) Shear

(C) Tensile

(D) Bending

Answer: B) Shear

63. A steel bar is loaded in tension. The weakest point is:

(A) At fixed end

(B) At applied load

(C) In center

(D) Anywhere in bar

Answer: D) Anywhere in bar

64. Elongation produced by a weight hanging from a wire is proportional to:

(A) Square of length

(B) Length

(C) Load (D) Area

Answer: B) Length

65. What is creep rupture?

(A) Plastic fracture due to creep

(B) Brittle fracture due to creep

(C) Loss of elasticity due to creep

(D) None

Answer: A) Plastic fracture due to creep

66. Brinell hardness number is determined by:

(A) Diameter of impression

(B) Load applied

(C) Time of application

(D) Area of impression

Answer: A) Diameter of impression

67. Failure by fatigue is:

(A) Sudden

(B) Gradual

(C) Progressive

(D) Reversible

Answer: A) Sudden

68. Modulus of resilience is the area under:

(A) Whole stress-strain curve

(B) Elastic portion only (C) Plastic portion only

(D) Breaking portion only

Answer: B) Elastic portion only

69. If length of wire is doubled, elongation by same load will:

(A) Double

(B) Quadruple

(C) Halve

(D) Remain same

Answer: A) Double

70. Impact strength is tested by:

(A) Charpy test

(B) Brinell test

(C) Rockwell test

(D) Fatigue test

Answer: A) Charpy test

71. Hardest material among:

(A) Aluminum

(B) Copper

(C) Mild steel

(D) Tungsten

Answer: D) Tungsten

72. Which value for Poisson's ratio is theoretical maximum?

(A) 0

(B) 0.25 (C) 0.33

(D) 0.5

Answer: D) 0.5

73. For metals, Poisson's ratio is generally:

(A) Less than 0.5

(B) Greater than 0.5

(C) Zero

(D) Infinite

Answer: A) Less than 0.5

74. In a tension test, proportional limit is always:

(A) Before elastic limit

(B) After elastic limit

(C) At yield point

(D) At breaking point

Answer: A) Before elastic limit

75. The ability to return to original shape after deformation is:

(A) Elasticity

(B) Plasticity

(C) Fatigue

(D) Stiffness

Answer: A) Elasticity

76. Cast iron is used for:

(A) Ductility

(B) Flexibility

(C) Compressibility

(D) Brittleness

Answer: D) Brittleness

77. What determines the toughness of material?

(A) Area under whole stress-strain curve

(B) Area under elastic region only

(C) Maximum stress

(D) Ultimate load

Answer: A) Area under whole stress-strain curve

78. What does hardness indicate?

(A) Resistance to deformation

(B) Resistance to scratching

(C) Resistance to fatigue

(D) Resistance to stress

Answer: B) Resistance to scratching

79. A stress which is always compressive is:

(A) Tensile

(B) Shear

(C) Bulking

(D) Hydrostatic

Answer: D) Hydrostatic

80. If the strain in a bar increases at constant load, the phenomenon is:

(A) Relaxation

(B) Creep

(C) Fatigue

(D) Hardness

Answer: B) Creep

81. What is the ultimate strength?

(A) Maximum stress in elastic region (B)

Maximum stress before breaking

(C) Minimum stress at yield

(D) Average stress at fracture

Answer: B) Maximum stress before breaking

82. Ductility is measured by:

(A) Elongation

(B) Reduction in area

(C) Both A and B

(D) None

Answer: C) Both A and B

83. The sudden reduction in cross-section after yield point is:

(A) Elastic deformation (B)

Plastic deformation

(C) Necking

(D) Creep

Answer: C) Necking

84. Proof resilience is expressed in:

(A) J

(B) J/m

(C) J/m^3

(D) J/kg

Answer: C) J/m^3

85. Hooke’s law is valid up to:

(A) Proportional limit

(B) Elastic limit

(C) Yield point

(D) Breaking point

Answer: A) Proportional limit

86. If load is tripled, elongation in a bar will be:

(A) Tripled

(B) Halved

(C) One-third

(D) Constant

Answer: A) Tripled

87. In a stress-strain diagram of mild steel, the region after ultimate point shows:

(A) Necking

(B) Elastic deformation

(C) Linear portion

(D) Constant stress

Answer: A) Necking

88. The modulus of rigidity for most metals is:

(A) 0.4E

(B) 0.6E

(C) 0.8E

(D) E

Answer: A) 0.4E

89. The yield strength corresponds to:

(A) Start of plastic deformation

(B) Ultimate load

(C) Breaking load

(D) Hardness

Answer: A) Start of plastic deformation

90. Endurance limit for steel is usually:

(A) Half the ultimate strength

(B) Twice the ultimate strength

(C) Equal to ultimate strength

(D) Equal to yield strength

Answer: A) Half the ultimate strength

91. Cast iron fails due to:

(A) Ductile fracture

(B) Brittle fracture

(C) Fatigue

(D) Hardness

Answer: B) Brittle fracture

92. Elastic constant is the property of:

(A) Elastic materials

(B) Plastic materials

(C) Metals only

(D) All solids

Answer: D) All solids

93. The material that absorbs maximum energy under impact loading is:

(A) Tough material

(B) Brittle material

(C) Elastic material

(D) Hard material

Answer: A) Tough material

94. Which property is important for spring materials?

(A) Ductility

(B) Elasticity

(C) Plasticity

(D) Toughness

Answer: B) Elasticity

95. The effect of repeated loading and unloading on metals leads to:

(A) Hardening

(B) Softenng

(C) Fatigue

(D) Creep

Answer: C) Fatigue

96. What does the area under elastic portion of stress-strain curve signify?

(A) Modulus of resilience

(B) Toughness

(C) Proof resilience

(D) Ductility

Answer: A) Modulus of resilience

97. Bending stress occurs due to:

(A) Axial load

(B) Twisting load

(C) Bending moment

(D) Shear force

Answer: C) Bending moment

98. The ratio of load to extension is called:

(A) Stiffness

(B) Elasticity

(C) Modulus of resilience

(D) Toughness

Answer: A) Stiffness

99. Which test is not meant for hardness?

(A) Brinell

(B) Rockwell

(C) Vickers (D) Charpy

Answer: D) Charpy

100. Poisson’s ratio is negative for:

(A) Metals

(B) Brittle materials

(C) Rubber

(D) Foam

Answer: D) Foam

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