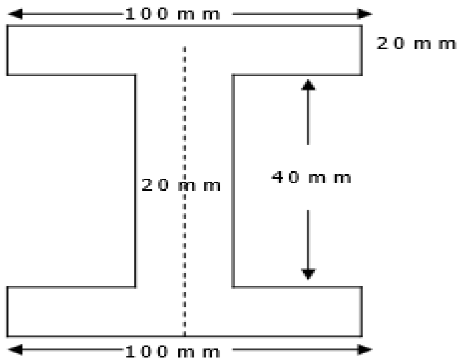
SUB- STRUCTURAL MECHANICS QUESTION BANK SEM-3RD

2 MARKS NQUESTION

CHAPTER-1

1. Show the condition of Equilibrium
2. What is free body diagram ?
3. State the parallel axis theorem
4. Define polar modulus
5. Define Malleability and fatigue of a material
6. Find out the CG of the section given below



CHAPTER-2

7. What is creep.
8. Define antisymmetrical & asymmetrical shape of an object
9. What is isotropic material ?
10. What is proof stress
11. What is Ductile matetial & example
12. Define the hooke's law .
13. Define poisson's ratio.
14. Describe tensile stress in brief.
15. Define the perpendicular axis theorem .
16. Write theory of simple bending.
17. What sign convention is followed universally for the bending moments?
18. Draw bending and shear force diagram of a simply supported beam when subjected to an udl of w/unit length over a snap of L.

CHAPTER-3

19. Describe the concept of second moment of area .
20. Define and write the equation for moment area method of slope.
21. Sketch the shear stress distribution in I section.
22. Define moment equation.
23. What is –ve beam?
24. What is section modulus
25. What is meant by composite section
26. What is ductile material
27. What is brittle material
28. Define stress strain relationship for ductile material
29. Define elastic limit

CHAPTER-4

30. What do u understand by beam? Describe the classification
31. Define parallel axis theorem
32. Define modulus of elasticity
33. Define bulk modulus
34. Define modulus of rigidity
35. Define bending moment
36. Define the contra flexural of a beam
37. Write down the assumption made in theory of simple bending
38. Define euler's formula
39. Differentiate between
    - Modulus of rigidity and modulus of elasticity
    - Bending moment and resisting moment
    - Slope and deflection of a loaded beam

CHAPTER-5

40. Define factor of safety
41. What is the moment of inertia of a circular section of diameter "d"
42. What is over hanging beam
43. What is simply supported beam
44. What is fixed beam
45. What is propped cantilever beam
46. Fill in the blanks
    - The internal resistance is called-------------------------
    - When material can be drawn into wires, it is called-----------------------material
    - E=2C(1+--------)
    - The rate of change of bending moment is equal to -------at the section of beam
    - At point where shear force is zero after changing its sign, bending moment is -------------
    - Moment of inertia about Z-Z axis is also called-----------
    - For no tension the eccentricity must not exceed-----------------------
    - In case of cantilever beam maximum deflection will be at ---------------
    - Effect of tensile foce is to-------------the length of the body
    - E=9------/(3K+C)
    - Moment of inertia of any section is----------------about an axis passing through C.G
    - In case of cantilever beam tensile stress is induced----------------the neutral axis

CHAPTER-6

47. Draw typical stress and strain curve of mild steal
48. Write salient features of S.F.D and B.M.D
49. What is the necessity of calculating slope and deflection
50. Calculate the moment of inertia of triangle and rectangle
51. What is volumetric strain
52. What do you mean by uniformly distributed load
53. What do you mean by moment of resistance
54. Give rankine's formula for column
55. What is relation between S.F and B.M
56. What is the relationship between S.F and loading
57. In a simply supported beam where will the bending moment be maximum
58. What do u mean by eccentricity

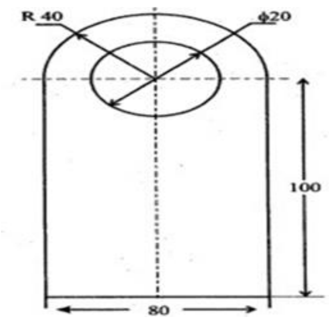
59.Differentiate between lateral strain and longitudinal strain
60.Draw S.F and B.M diagram for a cantilever carrying a point load W at the free end
61.State and explain the principal of virtual work

CHAPTER-7

62.Write down the castigliano's 1st theorem
63.What is the significance of unit load method
64.State the basic unit load formula
65.Explain mohr's circle
66.Differentiate perfect and imperfect frame
67.State maxwell's reciprocal theorem
68.Distinguished between pin joint and rigid joint
69.What are the assumption made in analysis of pin joint trusses
70.Define degree of freedom
71.State the three equilibrium theorem

10 MARKS QUESTION

1. A 250 gm depth into 150 mm width rectangles beam is subjected to maximum bending of 750 KN Determine
2. Derive the M.I. of a circular section.
3. Find the moment of inertia of a T section with flange as 150 mm 50 mm & web as 150 mm about x-x & y-y axis through the C.G. of the section
4. DefineC.G.andMoment ofInertia.Locate the C.G. of Triangle, Rectangle, Circle, and Semicircle & Trapezium with the help of plain figure.
5. State parallel & perpendicular axis theorem applied to moment ofInertia. Find the moment of Inertia of Rectangular section about its base.
6. Determine the centroid of the T-section 150*120*20mm& the below figure



7. Find the centroid of I section Top flange 100*20mm, Web 20mm*100mm, Bottom flange 200*20mm Calculate the center of gravity of the section shown in figure.

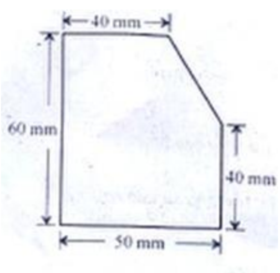


Fig. (i)

8. Find Moment of Inertia.

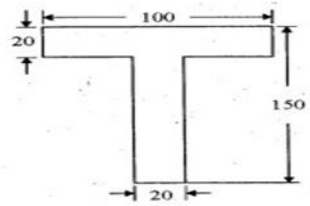


Fig. (iii)

Note :All dimensions are in mm.

9. Find the moment of inertia of a T section shown in fig.about X-X axis and Y-Y passing through the center of gravity of the section

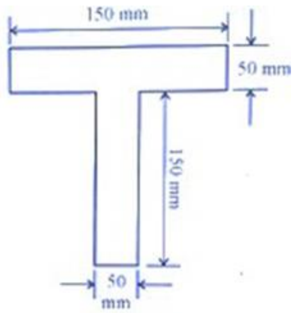


Fig. (ii)

10. Calculate the centroid of L-section

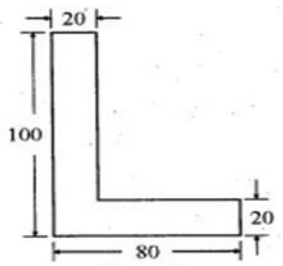
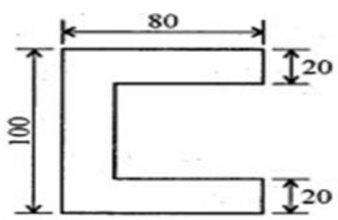


Figure (i)

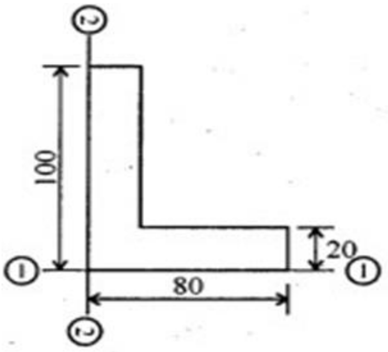
Note : All dimensions are in mm.

11. Calculatethecentroid.

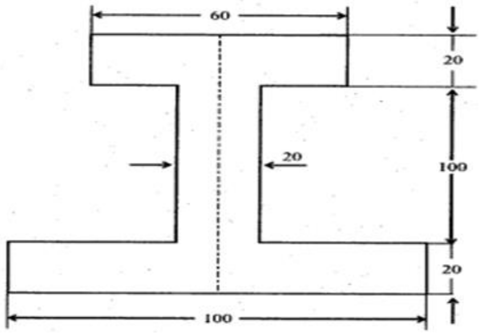


All Dimensions are in mm.

12. Find the M.I. of I-Section about XX & YY axis.



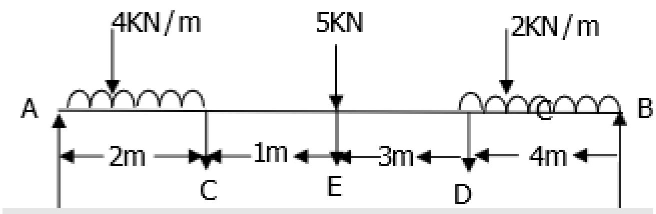
All Dimensions are in mm.



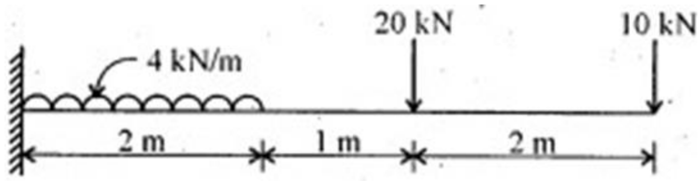
1. DefineYoung'smodulus&shearmodulus.
2. Explain Bulk modulus and modulus of rigidity. DefinePoisson'sratioandmodulusofrigidity.
3. Explainlinearandlateralstrain&Explainthermalstress andvolumetricstrain.
4. A tensile test is performed on a brass specimen 10mm in diameter using a gauge length of 50mm when applying axial tensile load of 25Kn it is observed that the distance between the gauge mark increased by 0.152mm. calculate modulus of elasticity of brass.
5. The Young's modulus for a given material is 100Kn/mm^2 and its modulus of rigidity is 40Kn/mm^2. Determine its bulk modulus and also its lateral contraction if the diameter is 50mm and length is 2m and extension is 2mm
6. A mile stress rod of 20 mm dia & 300 mm long is enclosed centrally inside a hollow copper to be of external dia 30 mm & internal dia. 25 mm. the ends of the rod & tube are braced together & the composite bar is subjected to an axial pull of 50 KN. Find out the stress developed in the rod & the tube
7. A slender bar of 100 mm2 C/S is subjected to loading as shown in the fig., if the modulus of elasticity is 2×10^9 pascal, then what is the elongation produced in the bar ?
8. A rod dia. 40 mm & length 6 m has an allowable tensile stress of 120 N/mm2. If the young's modulus of the rod material is 2.1×10^5 N/mm2 . Determine the (i) Maximum tensile load, that can be loaded apply to the load (ii) Strain energy stored on the road
9. A bronze specimen has modulus of rigidity 0.98×10^3 N/mm2 & modulus of elasticity 1.39×10^3N/mm2. Determine the poison's ratio of the material
10. A brass bar having C/S area of 500 mm^2 is subjected to axial forces as shown in fig. Find the total elongation of the bar. Take E = 80 GPa.
11. Derive the relationship between the elastic constant.
12. A circular rod of steel is 20mm in diameter and 500mm long it is subjected to an axial pull of 45kN.If E for steel is 2*10^5 N/mm^2 find stress, linear strain, change in length, change in volume take v=0.25
13. A circular rod of steel is 20mm in diameter and 500mm long it is subjected to an axial pull of 45KN.If $E=200*10^3 N/mm^2$.Find stress,linear strain ,change in length and change in volume of the bar.
14. A steel bar 50mm wide,12mm thick,300mm long is subjected to an axial pull of 100KN.Find change in length,width,thickness andvolume of the bar. E=2*10^5N/mm^2,u=0.32
15. A Bar of 30mm diameter is subjected to a pull of 60KN.Then measured extension on gauge length of 200mm is 0.09mm and the change in diameter is 0.0039mm.Calculate the poison's ratio & the values of the Young's modulus, Rigidity modulus & Bulk Modulus

16. A bar of 30mm dia.is subjected to a pull of 60KN.The measured extension is 0.09mm and gauge length of 200mm and change in diameter is 0.0039mm.calculate a)Poisson's ratio b)Young'smodulus c)Bulk Modulus d)Rigidity Modulus
17. A steel bar 2m long 40mm wide and 20mm thickness is subjected to axial pull of 160kN in the direction of its length. Find the change inlength,widthandthicknessofbar.TakeE=200GPaand Poisson'sratio=0.3
18. The principal stresses at a point across two ⊥r planes are 75 MN/m2 & 35 MN/m2 (tensile). Find the normal, tangential stresses & the resultant stress & its obliquity on a plane at 2i with major principal plane .

19. Name different types of beams & different types of loads with sketches. Name the type of loads acting on the beam with illustration.
20. Define shear force and bending moment in beams. Explain Sagging and Hogging bending moment. Explain point of Contra-flexure in a beam.
21. Derive the relationship between the rate of loading S.F. and B.M. at a section of beam.
22. A beam is simply supported and carries a uniformly distributed load of 40 KN/m run over the whole span. The section of the beam is rectangle having depth as 500 mm. If the maximum stress in the material of the beam is 120 N/mm2 & moment of inertia of the section is 7 ? 108 mm4, find the span of the beam.
23. A rectangular strut is 150 mm & 120 mm thicks it carries a load of 180 kN at an eccentricity of 10 mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in the section
24. A water main at 1000 mm internal dia & 10 mm thick is running full. If the bending stress is not to exceed 60 N/mm2, find out the greatest span in which the pipe may be preely supported steel & water weigh 76.8 KN/m3 & 10 NM/m3
25. A beam of length 5 m is ?/s at the ends, carries a udl of 2 KN/m throughout the length & two concentrated loads of 5 KN & 3 KN at a distance of 2 m & 3 m from the left end. Calculate S.F & B.M.D.
26. A s/s beam AB, 10 m long is loaded as shown in fig. Construct the S.F. & B.M.D. for the beam & find the position & valve of maximum B.M.



27. A cantilever 5m long carries point loads of 30KN & 10KN at a distance of 1m & 5m from the fixed end. In addition to this the beam carries a UDL 10KN/m between the point loads. Draw SFD& BMD
28. A simply supported beam 4m long is subjected to two point loadsof 2KN & 4KN each at a distance of 1.5m & 3m from the left end.Draw SFD & BMD.
29. A simply supported beam of 8m carries an UDL of 5kN/m for alength of 3m from the left support and point loads of 6Kn, 5kN and 4kN at 4m,5m and 6m from the left support. Draw SFD and BMD.
30. A cantilever beam of span 4m carries point loads of 2KN at itsfree end & 5KN at 1m from free end. Sketch SFD & BMD.
31. Draw SFD & BMD



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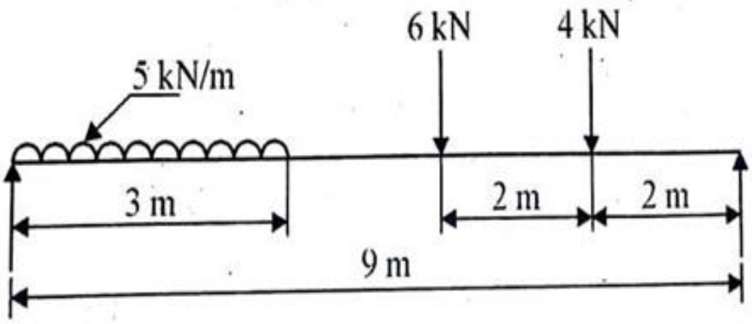
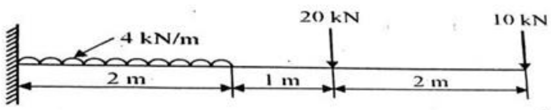
32. A simply supported beam having a span of 6m carries a UDL of 12KN/m over a length of 4m commencing from left hand support.It is also carries a point load of 10KN at a distance of 1m from theright support. Draw SFD & BMD.
33. A cantilever beam of span 3m carries an UDL of 2 KN/n over a length of 2m from support. In addition it is also carries point loads of 1KN,2KN,3KN at free end ,1m & 2m from free endrespectively .Draw SFD &BMD
34. A simply supported beam of 8m span carries point loads of 10KN & 20KN at 3m & 5m respectively from the left support. In addition it also carries a UDL of 10KN for 3 m starting from the rightsupport. Draw SFD & BMD
35. Draw SFD and BMD for the cantilever beam shown in fig.



36. Draw SFD and BMD for the simply supported beam shown in fig.



37. A cantilever 5m long carries point load of 30Kn and 10Kn at a distance of 5m from fixed end.in addition to this the beam carries a UDL of 10Kn/m between the point load. Construct shear force and bending moment diagram giving all salient values
38. Explain moment of resistance & modulus of rapture. List the assumptions in Theory of simple bending.
39. Derive the simple bending stress equation.

$$\text{i.e.}\frac{M}{I}=\frac{E}{R}=\frac{\sigma_b}{y}$$

40. Write the bending equations with all notations. Explain modulus of section for solid, rectangular and circularsections.

41. The moment of inertia of the beam section 500mm deep is 69.49*10^7mm^4 find the longest span over which a beam of this section when simply supported could carry a UDL of 50Kn/m run.the stress in the material is not to exceed 110N/mm^2.
42. A beam is simply supported and carries a UDL of 40KN/m run over the whole span.If section of the beam is rectangular having depth as 500mm.If the maximum stress in the material of the beam is120N/mm^2 & MI is 7*10^8 mm^4.Find the span of the beam.
43. A beam of rectangular c/s is 200 mm wide & 350 mm deep. If the section is subjected to a maximum shear force 30 kN, Find the maximum shear stress & sketch the shear stress distribution along the depth of the beam.

STRUCTURAL ANALYSIS
MCQ QUESTIONS

1. What is elasticity?
   A. ability to re-gain It's original size and shape
   B. ability to produce permanent deformation
   C. both
   D. none of above
2. What is modular ratio?
   A. ratio of deflection in each material
   B. ratio of modulus of elasticity of bot h material
   C. ratio of load acting in each section
   D. all of above
3. 3.5 m long bar is under tensile load and due to that increase in length of bar is 1.75 mm then strain
   A. 0.0035
   B. 0.0005
   C. 0.002
   D. 0.0175
4. The increase in the length of a bar of length 1 m, area 300 mm2, modulus of elasticity 2×10^5 N/mm2 due to a tensile load of 120 KN is .
   A. 1 mm
   B. 2mm
   C. 3mm
   D. 4mm
5. Shear stress causes .
   A. Deformation
   B. Elongation
   C. contraction
   D. None of above
6. which of the following has same unit?
   A. modulus of elasticity, pressure, stress
   B. elasticity, strain, stress
   C. pressure, strain, stress
   D. modulus of elasticity, strain, modulus of rigidity
7. unit of stress is .
   A. Pascal
   B. Newton
   C. N/m2
   D. a and c both
8. In composite section deformation is same in both materials.
   A. True
   B. False
   C. None
   D. All
9. which of the following is type of stress?
   A. tensile stress
   B. compressive stress
   C. shear stress
   D. all of the above
10. Strain is defined as the ratio of
    A. change in volume to original volume
    B. change in length to original length
    C. change in cross-sectional area to original cross-sectional area
    D. any one of the above
11. Hooke's law holds good up to
    A. yield point
    B. limit of proportionality
    C. breaking point
    D. elastic limit
12. 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

13. The unit of Young's modulus is
  A. mm/mm
  B. kg/cm
  C. kg
  D. kg/cm2

14. Deformation per unit length in the direction of force is known as
  A. Strain
  B. lateral strain
  C. linear strain
  D. linear stress

15. It equal and opposite forces applied to a body tend to elongate it, the stress so produced is called
  A. internal resistance
  B. tensile stress
  C. transverse stress
  D. compressive stress

16. The materials having same elastic properties in all directions are called
  A. ideal materials
  B. uniform materials
  C. isotropic materials
  D. elastic materials

17. Modulus of rigidity is defined as the ratio of
  A. longitudinal stress and longitudinal strain
  B. volumetric stress and volumetric strain
  C. lateral stress and lateral strain
  D. shear stress and shear strain

18. If the radius of wire stretched by a load is doubled, then its Young's modulus will be
  A. Doubled
  B. Halved
  C. become four times
  D. remain unaffected

19. The intensity of stress which causes unit strain is called
  A. unit stress
  B. bulk modulus
  C. modulus of rigidity
  D. modulus of elasticity

20. Which of the following has no unit
  A. kinematic viscosity
  B. surface tension
  C. bulk modulus
  D. strain

21. Euler's formula states that the buckling load P for a column of length l, both ends hinged and whose least moment of inertia and modulus of elasticity of the material of the column are I and E respectively, is given by the relation
  A. P=2EI/L2
  B. P=L/2EI
  C. P=EI/L2
  D. P=2EI /L3

22. Rankine-Golden formula accounts for direct as well as buckling stress and is applicable to
  A. very long columns
  B. long columns
  C. short columns
  D. intermediate columns

23. Maximum deflection of a cantilever due to pure bending moment M at its free end, is
  A. ML2/3EI
  B. ML2/4EI
  C. ML2/6EI
  D. ML2/2EI

24. The ratio of the effective length of a column and minimum radius of gyration of its cross-sectional area, is known
  A. buckling factor
  B. slenderness ratio
  C. crippling factor
  D. none of these

25. A long vertical member, subjected to an axial compressive load, is called
A. a column
B. a strut
C. a tie
D. a stanchion

26. Columns of given length, cross-section and material have different values of buckling loads for different end conditions. The strongest column is one whose
A. one end is fixed and other end is hinged
B. both ends are hinged or pin jointed
C. one end is fixed and the other end entirely free
D. both the ends are fixed

27. The slenderness ratio of a vertical column of square cross- section of 10 cm side and 500 cm long, is
A. 117.2
B. 17.3
C. 173.2
D. 137.2

28. The equivalent length of a column fixed at one end and free at the other end, is
A. 0.5L
B. 0.7L
C. L
D. 2L

29. The radius of gyration of a squar section is not proportional to
A. square root of the moment of inertia
B. square root of the inverse of the area
C. square root of the moment of inertia divided by area of the section
D. side of square

30. The length of a column, having a uniform circular cross-section of 7.5 cm diameter and whose ends are hinged, is 5 m. If the value of E for the material is 2100 kN/cm2, the permissible maximum crippling load will be
A. 1.288 kN
B. 12.88 kN
C. 128.8 kN
D. 288.0 kN

31. A sudden increase or decrease in shear force diagram between any two points indicates that there is
A. No loading between the two points
B. Point loads between the two points
C. U.D.L. between the two points
D. None of these

32. A beam is a structural member which is subjected to
A. Axial tension or compression
B. Transverse loads and couples
C. Twisting moment
D. No load, but its axis should be horizontal and x-section rectangular or circular

33. Which of the following are statically determinate beams?
A. Only simply supported beams
B. Cantilever, overhanging and simply supported
C. Fixed beams
D. Continuous beams

34. A cantilever is a beam whose
A. Both ends are supported either on rollers or hinges
B. One end is fixed and other end is free
C. Both ends are fixed
D. Whose both or one of the end has overhang

35. In a cantilever carrying a uniformly varying load starting from zero at the free end, the shear force diagram is
A. A horizontal line parallel to x-axis
B. A line inclined to x-axis
C. Follows a parabolic law
D. Follows a cubic law

36. In a simply supported beam, bending moment at the end
A. Is always zero if it does not carry couple at the end
B. Is zero, if the beam has uniformly distributed load only
C. Is zero if the beam has concentrated loads only
D. May or may not be zero

37. For any part of the beam, between two concentrated load Shear force diagram is a
   A. Horizontal straight line
   B. Vertical straight line
   C. Line inclined to x-axis
   D. Parabola

38. For any part of a beam between two concentrated load, Bending moment diagram is a
   A. Horizontal straight line
   B. Vertical straight line
   C. Line inclined to x-axis
   D. Parabola

39. For any part of a beam subjected to uniformly distributed load, Shear force diagram is
   A. Horizontal straight line
   B. Vertical straight line
   C. Line inclined to x-axis
   D. Parabola

40. For any part of a beam subjected to uniformly distributed load, bending moment diagram is
   A. Horizontal straight line
   B. Vertical straight line
   C. Line inclined to x-axis
   D. Parabola

41. In a simple supported beam having length = l and subjected to a concentrated load (W) at mid-point.
   A. Maximum Bending moment = Wl/4 at the mid-point
   B. Maximum Bending moment = Wl/4 at the end
   C. Maximum Bending moment = Wl/8 at the mid-point
   D. Maximum Bending moment = Wl/8 at the end

42. In a cantilever subjected to a concentrated load (W) at the free end and having length =l, Maximum bending moment is
   A. Wl at the free end
   B. Wl at the fixed end
   C. Wl/2 at the fixed end
   D. Wl at the free end

43. At a point in a simply supported or overhanging beam where Shear force changes sign and = 0, Bending moment is
   A. Maximum
   B. Zero
   C. Either increasing or decreasing
   D. Infinity

44. In a cantilever subjected to a combination of concentrated load, uniformly distributed load and uniformly varying load, Maximum bending moment is
   A. Where shear force=0
   B. At the free end
   C. At the fixed end
   D. At the mid-point

45. Point of contra-flexure is a
   A. Point where Shear force is maximum
   B. Point where Bending moment is maximum
   C. Point where Bending moment is zero
   D. Point where Bending moment=0 but also changes sign from positive to negative

46. Point of contra-flexure is also called
   A. Point of maximum Shear force
   B. Point of maximum Bending moment
   C. Point of inflexion
   D. Fixed end

47. The slope of shear force line at any section of the beam is also called
   A. Bending moment at that section
   B. Rate of loading at that section
   C. Maximum Shear force
   D. Maximum bending moment

48. The direction of shear stress in a loaded beam is
   A. Horizontal
   B. Horizontal as well as vertical
   C. Vertical
   D. None

49. Shear stress in the beam acting on the cross section is
   A. Normal to the cross section
   B. Tangential to the cross section
   C. Neither normal nor tangential
   D. None

51. Which type of load is applied in tensile testing?
   A. Axial load
   B. Shear load
   C. Transverse load
   D. Longitudinal load

52. Which law is also called as the elasticity law?
   A. Bernoulli's law
   B. Stress law
   C. Hooke's law
   D. oisson's law

53. The materials which have the same elastic properties in all directions are called ___
   A. Isotropic
   B. Brittle
   C. Homogeneous
   D. Hard

54. The calculation of the moment of the body due to the loadings involve a quantity called ____
   A. Moment
   B. Inertia
   C. Moment of Inertia
   D. Rotation

55. Moment of Inertia is the integration of the square of the distance of the centroid and the del area along the whole area of the structure.
   A. True
   B. False
   C. none
   D. all

56. What is parallel axis theorem and to whom it is applied?
   A. Theorem used to add the two mutually perpendicular moment of inertias for areas
   B. Theorem used to add the two mutually perpendicular moment of inertias for volumes
   C. Theorem used to add the two mutually perpendicular moment of inertias
   D. Theorem used to add the two mutually perpendicular moment of inertias for vectors

57. The parallel axis theorem gives the moment of inertia _____to the surface of considerance.
   A. Linear
   B. Non-Linear
   C. Perpendicular
   D. Parallel

58. In the calculation of the radius of gyration, we use intensity of loadings. So whenever the distributed loading acts perpendicular to an area its intensity varies __
   A. Linearly
   B. Non-Linearly
   C. Parabolically
   D. Cubically

59. Elongation of a bar of uniform cross section of length „L?, due to its own weight „W? is given by
   A. 2WL/E
   B. WL/E
   C. WL/2E
   D. WL/3E

60. steel bar 10 mm x 10 mm cross section is subjected to an axial tensile load of 20kN. If the length of bar is 1 m and E = 200 GPa, then elongation of the bar is:
   A. 1 mm
   B. 0.5 mm
   C. 0.75 mm
   D. 1.5 mm

61. The modulus of rigidity and poisson?s ratio of a material are 80 GPa and 0.3 respectively. Its young?s modulus will be

A. 160 GPa
B. 208 GPa
C. 120 GPa
D. 104 GPa

62. If the value of poisson?s ratio is zero

A. the lateral strain is high
B. the material is perfectly elastic
C. there is no linear strain in the material
D. none of the above

63. The ratio between direct stress and volumetric strain is:

A. Bulk modulus
B. Poisson's ratio
C. Factor of safety
D. Modulus of rigidity

64. Young?s modulus of a material which gives 2 kN/mm2 stress at 0.01 strain is

A. 20kN/mm2
B. 0.02kN/mm2
C. 200 kN/mm2
D. 2000kN/mm2

65. The Young?s modulus of elasticity of a material is 2.5 times its modulus of rigidity. The Poisson?s ratio for the material will b

A. 0.33
B. 0.50
C. 0.75

66. Consider a 250mmx15mmx10mm steel bar which is free to expand is heated from 150C to 400C. what will be developed?

A. Compressive stress
B. Tensile stress
C. Shear stress
D. No stress

67. The safe stress for a hollow steel column which carries an axial load of 2100 kN is 125 MN/m2. if the external diameter of the column is 30cm, what will be the internal diameter?

A. 25 cm
B. 26.19cm
C. 30.14 cm
D. 27.9 cm

68. 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

69. 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

70. 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

71. Rupture stress is

A. breaking stress
B. maximum load/original cross-sectional area
C. load at breaking point/A
D. load at breaking point/neck area

72. stress at which extension of material takes place more quickly as compared to 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

73. 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

74. The 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

75. Resilience of a material is considered when it is subjected to
   A. frequent heat treatment
   B. fatigue
   C. creep
   D. shock loading

76. The total strain energy stored in a body is termed as
   A. resilience
   B. proof resilience
   C. modulus of resilience
   D. toughness

77. Proof resilience per material is known as
   A. resilience
   B. proof resilience
   C. modulus of resilience
   D. toughness

78. The stress induced in a body due to suddenly applied load compared to when it is applied gradually is
   A. same
   B. half
   C. two times
   D. four times

79. 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

80. 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 cm2. Ultimate tensile strength of specimen is
   A. 4 tonnes/cm2
   B. 8 tonnes/cm2
   C. 16 tonnes/cm2
   D. 22 tonnes/cm2

81. 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

82. An axial pull of 50 KN is suddenly applied to a steel bar 2 m long and 1000 mm2 in cross-section. If modulus of elasticity is 200 GPa, find strain energy stored in the bar
   A. 10,000 N.mm
   B. 20,000 N.mm

C. 25,000 N.mm
D. 50,000 N.mm

83. A simply supported beam 6 m long and of effective depth 50 cm, carries a uniformly distributed load 2400 kg/m including its self weight. If the lever arm factor is 0.85 and permissible tensile stress of steel is 1400 kg/cm2, the area of steel required, is

A. 14 cm2
B. 15 cm2
C. 16 cm2
D. 17 cm2

84. A 10 m long mild steel rail section is fixed at 300 K temperature. If temperature increases by 60 K, find stress in rail section if ends are not yielded. Coefficient of thermal expansion is 12×10-6/K.

A. 72 N/mm2
B. 144 N/mm2
C. 120 N/mm2
D. 240 N/mm2

85. The ultimate shear stress of a mild steel plate of 10 mm thickness is 350 N/mm2. Calculate the diameter of the hole that can be punched to it without exceeding a compressive stress of 700 N/mm2.

A. 10 mm
B. 20 mm
C. 7 mm
D. 35 mm

86. A bar 2 m long and 20 mm diameter is subjected to an axial pull of 125.6 KN. Due to this load, length increases by 4 mm and diameter reduce by 0.012 mm. Find Poison?s ratio.

A. 0.2
B. 0.25
C. 0.3
D. 0.35

87. A composite section of R.C.C. column 300mm×300mm in section having 20mm diameter 4 bars, one at each corner. Strength of concrete is 5 N/mm2 and modular ratio Es/Ec=9. Calculate load taken by column.

A. 150 KN
B. 200 KN
C. 400 KN
D. 500 KN

88. The moment of inertia of a triangular section of base 3 unit and height 2 unit, about an axis passing through its base is .

A. 6
B. 9
C. 8
D. 2

89. Moment of inertia of a square of side 1 unit about an axis through its center of gravity, is .

A. 1
B. 1/1
C. 1/3
D. 1/4

90. The axis about which moment of area is taken is known as .

A. Axis of area
B. Axis of moment
C. Axis of reference
D. Axis of rotation

91. What is the formula of theorem of parallel axis?

A. Iab = Ig + ah
B. Iab = ah2 + Ig
C. Iab = Ig – ah2
D. Izz = Iyy + Ixx

92. Moment of inertia of a circular section of 2 cm diameter, about an axis through its centre of gravity, is .

A. πr2/64
B. πr2/4
C. πr2/16
D. πr2 /2

93. What is the unit of section modulus?

A. mm

B. mm2
C. mm3
D. mm4

94. What is the formula of theorem of perpendicular axis?

A. Izz = Ixx – Iyy
B. Izz = Ixx + Ah2
C. Izz – Ixx = Iyy
D. None of the above

95. What is the unit of moment of inertia?

A. mm
B. mm2
C. mm3
D. mm4

96. What is the unit of Radius of gyration?

A. mm
B. mm2
C. mm3
D. mm4

97. What is the formula of radius of gyration?

A. k2 = I/A
B. k2 = I2/A
C. k2 = I2/A2
D. k2 = (I/A)1/2

98. What will be the radius of gyration of a circular plate of diameter 10cm?

A. 1.5cm
B. 2.0cm
C. 2.5cm
D. 3.0cm

99. Moment of inertia of any section about an axis passing through its C.G is

A. Maximum
B. Minimum
C. Depends upon the dimensions of the section
D. Depends upon the shape of the section

100. The moment of inertia of a triangular section of base „b? and height h,about an axis passing through its base is ……. times the moment of inertia about an axis passing through its C.G. and parallel to the base

A. 9
B. 4
C. 2
D. 3