JUNIOR ENGINEERING

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1. What change is observed in the BMD and SFD in the case of an external couple acting at a point in a beam?

 a) Sudden change in BMD at the point of application of couple

 b) Sudden change in SFD at the point of application of couple

 c) Sudden change in both SFD and BMD

 d) No change at all

ans-(a)

2. According to the parallel axis theorem, moment of inertia w.r.t any axis parallel to the centroidal axis is equal to

 a) Sum of moment of inertia w.r.t the centroidal axis and product of area and square of distance between two axes

 b) Moment of inertia w.r.t the centroidal axis

 c) Polar moment of inertia

 d) None of the above

 ans-(a)

3. What type of deformation does a stressed body undergo after the limit of proportionality has been crossed?

 a)Elastic deformation

 b) Plastic deformation

 c) Elastoplastic deformation

 d) Semi plastic deformation

4. Saint Venant's theory of elastic failure is also known as

 a) Maximum principal stress theory

 b) Maximum principal strain theory

 c) Maximum shear stress theory

 d) Maximum shear strain theory

ans-(b)

5. The deformation of a bar under its own weight is equal to

 a) Half the deformation of the bar under the axial load equal to the weight of the body

 b) Twice the deformation of the bar under the axial load equal to the weight of the body

 c) One third the deformation of the bar under the axial load equal to the weight of the body

 d) The deformation of the bar under the axial load equal to weight of the body

ans-(a)

6. The maximum tolerance for measurement by a 20m chain is

 a) ±2 mm   b) ±3 mm

 c) ±5 mm   d) ±8 mm

ans-(c)

7. The correction for sag is

 a) Always additive

 b) Always subtractive

 c) Always zero

 d) Sometimes additive and sometimes subtractive

ans-(b)

8. With the rise of the temperature, the sensitivity of the bubble tube

 a) Increases

 b) Decrease

 c) Remains unaffected

 d) None of the above

ans-(a)

9. Water-cement ratio is:

 a) The ratio of volume of water mixed in concrete to volume of cement used

 b) The ratio of weight of water mixed in concrete to weight of cement used

 c) The ratio of volume of water mixed in concrete to weight of cement used

 d) The ratio of mass of water mixed in concrete to weight of cement used

ans-(a)

10. The thermal coefficient of concrete:

 i) Depends on nature of concrete

 ii) Depends on the cement content

 iii) Depends on the relative humidity

 iv) Depends on the size section

 a) i) and ii) only   b) ii) and iii) only

 c) iii) only   d) All of the above

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ans-(d)

11. The modulus of elasticity E for steel used reinforcement in N/mm^2 is taken as

a) 2 X 10^5 b) 3 X 10^5

c) 0.02 X 10^5 d) 0.2 X 10^5

ans-(a)

12. For compressive strength test on concrete IS code recommends use of cubes of size:

a) 200 X 200 X 200mm

b) 100 X 100 X 100 mm

c) 150 X 100 X 100 mm

d) 250 X 250 X 250mm

ans-(b)

13. Moment of inertia of a triangular section, with a base width of 'b' width and height 'h' with respect to an axis through the centroid is

a) bh^3/12   b) bh^3/36

c) hb^3/12   d) hb^3/36

ans-(b)

14. In the post tensioning system for medium and large force, following system is used:

a) Freyssinet system

b) PSC monowire system

c) Gifford Udall-CGL System

d) Le-McCall system

ans-(a)

15. Columns with low slenderness ratio fail under

a) Buckling

b) Large lateral deflection

c) Ultimate loads

d) All of the above

ans-(c)

16. An axially loaded column is of 300mm X 300mm size. Effective length of column is 3m. What is the minimum eccentricity of the axial load for the column?

a) 0   b) 10mm

c) 16mm   d) 20mm

ans-(d)

17. Diagonal tension reinforcement is provided in a beam as

a) Longitudinal bars

b) Bent up bars

c) Helical reinforcement

d) 90° bend at the bends of main

ans-(b)

18. Flexural collapse in over reinforced beams is due to

a) Primary compression failure

b) Secondary compression failure

c) Primary tension failure

d) Bond failure

ans-(a)

19. Limit state of collapse deals with

a) Strength and stability of the structure

b) Conditions such as deflection, cracking

c) Durability

d) All of the above

ans-(a)

20. Characteristic strength of material is its

a) Ultimate strength

b) Safe strength

c) Maximum strength

d) Maximum strength

ans-(b)

21. According to IS 456, Maximum cement content inclusive of admixtures is

a) 200kg/m^3 b) 250kg/m^3

c) 300kg/m^3 d) 350kg/m^3

ans-(c)

22. End anchorage of bars is taken as the greater of

a) Effective depth or 12 times the diameter of bar

b) Effective depth or 16 times the diameter of bar

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c) Effective depth or 24 times the diameter of bar

d) Effective depth or 48 times the diameter of bar

ans-(a)

23. Calculate the effective flange width of the following T-beam:

Thickness of slab, D_f=100mm

Width of rib, B_w=300mm

Depth of beam, D=500mm

Centre to Centre distance of beam=3.0mm

Effective span of beam=6.0mm

Distance between points of contraflexure, l_o=3.6m

a) 3000mm   b) 1900mm

c) 1600mm   d) 1500mm

ans-(d)

24. The shear associated with change of bending moment along the span is known as :

a) Punching shear   b) Torsion shear

c) Flexural shear   d) None of the above

ans-(c)

25. In a beam the diagonal tension is inclined at an angle of ……..with the horizontal.

a) 30° b) 45°

c) 90° d) 135°

ans-(b)

26. Flexural shear failure occurs under:

a) Large shear force and less bending moment

b) Large bending moment and less shear force

c) Crushing of concrete

d) Sudden application of load

ans-(b)

27. The design shear strength in concrete depends on

a) Depth of the section

b) Loading of the section

c) Percentage of the steel

d) All of the above

ans-(c)

28. Minimum shear reinforcement is provided for

a) The prevention of tension failure

b) Holding the reinforcement in place when concrete is poured

c) The prevention of brittle failure

d) All of the above

ans-(d)

29. The use of bundled bars in concrete helps to

a) Reduce deflection

b) Reduce bending moment

c) Increase effective depth

d) All of the above

ans-(c)

30. A partially prestressed member is one in which

a) Tensile stresses and cracking are permitted under service loads

b) No tensile stresses are permitted under service loads

c) Mild steel is used in addition to prestressing steel

d) Tensile stresses are permitted but not cracking at service loads

ans-(a)

31. In case of pre-tensioned RC beams

a) Shrinkage of concrete is of the order of 3×10^{-4}

b) Relaxation of steel can be calculated at the time of transfer

c) Only one wire can be stretched at a time

d) Even mild steel can be used for restressing

ans-(a)

32. Which one the following instruments is used in plane table surveying for the measurements of horizontal and vertical distances directly?

a) Plane alidade   b) Telescope alidade

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b) Tacheometer   d) Clinometer

ans-(a)

33. Locating the position of a plane table station with reference to three known point is known as

    a) Intersection method

    b) Radiation method

    c) Resection method

    d) Three-point problem

ans-(d)

34. If Δ is the angle of deflection of a circular curve of radius R, the length of the Curve is

    a) $\dfrac{\pi R\,\Delta}{90°}$ b) $\dfrac{\pi R\,\Delta}{180°}$

    c) $\dfrac{\pi R\,\Delta}{270°}$ d) $\dfrac{\pi R\,\Delta}{360°}$

ans-(b)

35. Radar speedometer is used to measure

    a) Spot speed   b) Average speed

    c) Running speed   d) Overall speed

ans-(a)

36. For night travel, the length of a valley curve should be such that, the head-light beam distance is same as the

    a) Stopping sight distance

    b) Overtaking sight distance

    c) Sum of (a) and (b)

    d) Difference of (a) and (b)

ans-(a)

37. Design of horizontal and vertical alignment, super elevation, sight distance and grades is most effected by

    a) Width of vehicle

    b) Length of vehicle

    c) Height of vehicle

    d) Speed of vehicle

ans-(d)

38. The magnitude of tyre pressure controls the following:

    a) Total thickness of the pavement

    b) Number of layers to be provided in pavement

    c) Type of sub-base and base course

    d) Quality of material to be used in the upper layers of pavement

ans-(d)

39. Creeping of rails can be checked by

    a) Chairs   b) Bearing plates

    c) Anchors   d) Spikes

ans-(c)

40. Number of fish bolts per fish plate is

    a) 2   b) 4

    c) 5   d) 6

ans-(b)

41. A streamline is a line :

    a) Which is along the path of the particle

    b) Which is always parallel to the main direction of flow

    c) Along which there is no flow

    d) On which tangent drawn at any point given the direction of velocity

ans-(d)

42. Navier Stoke's equation represents the conversation of

    a) Energy   b) Mass

    c) Pressure   d) Momentum

ans-(d)

43. Which phenomenon will occur when the value at the discharge end of a pipe connected to a reservoir is suddenly closed?

    a) Cavitation   b) Erosion

    c) Hammering   d) Surging

ans-(c)

44. Weber's number is given as

    a) $\dfrac{InertiaForce}{ViscousForce}$ b) $\dfrac{InertiaForce}{GravityForce}$

    c) $\dfrac{InertiaForce}{\Pr essureForce}$ d) $\dfrac{InertiaForce}{SurfaceTension}$

45. Anemometer is used to measure

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a) Flow rate

b) Velocity

c) Static pressure

d) Difference between static and stagnation pressure

ans-(a)

46. A riveted joint may fail

a) In shear

b) In bearing

c) In crushing of rivets

d) All of the above

ans-(d)

47. According to Unwin's formula, if t is the thickness of plate in mm the nominal diameter of rivet is

a) 1.91t

b) 1.91t^2

c) 1.91 $\sqrt{t}$

d) 6.01 $\sqrt{t}$

ans-(d)

48. The maximum deflection limit for steel beam is

a) span/180

b) span/200

c) span/325

d) span/400

ans-(b)

49. A beam which carry the roof loads in trusses are

a) Girder

b) Grit

c) Purlin

d) Rafter

ans-(c)

50. A plastic hinge is a zone of yielding due to :

a) Tension

b) Shear

c) Flexure

d) All of the above

ans-(c)

51. The maximum slenderness ratio for tension members is

a) 180

b) 350

c) 400

d) None of these

ans-(c)

52. The Westerguard analysis is suitable for

a) Homogenous soil

b) Cohesive soil

c) Cohesionless soil

d) Stratified soil

ans-(a)

53. A pile which obtains most of its carrying capacity at the base of pile is known as

a) End bearing pile

b) Friction piles

c) Composite pile

d) All of the above

ans-(a)

54. Coefficient of consolidation is used for calculating

a) Time rate of settlement

b) Total settlement

c) Preconsolidation pressure

d) Stress in soil

ans-(a)

55. Effective stress in a soil is the stress carried by the

a) Soil mass as a whole

b) Pore water present in the soil

c) Air present in the voids

d) Solids present in the soil mass

ans-(b)

56. The collapse load for a simply supported beam of length L and concentrated load W at centre is

a) $W_u = \dfrac{4M_p}{L}$

b) $W_u = \dfrac{2M_p}{L}$

c) $W_u = \dfrac{8M_p}{L}$

d) $W_u = \dfrac{M_p}{L}$

ans-(a)

57. In-situ vane shear test is conducted to determine the shear strength of

a) Cohesive soil

b) Non-cohesive soil

c) Silty soil

d) Sandy

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ans-(a)

58. The changes that takes place during the process of consolidation of a saturated clay would include

a) An increase in pore water pressure and an increase in effective pressure

b) An increase in pore water pressure and a decrease in effective pressure

c) A decrease in pore water pressure and a decrease in effective pressure

d) A decrease in pore water pressure and an increase in effective pressure

ans-(d)

59. The initial and final void ratios of a clay sample in a consolidation test are 1.0 and 0.5 respectively. If the initial thickness of the sample is 2.4cm, then its final thickness will be

a) 1.3cm   b) 1.8cm

c) 1.9cm   d) 2.2cm

ans-(b)

60. A soil sample is having a specific gravity 2.60 and void ratio of 0.78. The water content required to fully saturate the soil at that void ratio would be

a) 10%   b) 30%

c) 50%   d) 70%

ans-(b)

61. A sand deposit has a porosity of 1/3 and its specific gravity is 2.5.The critical hydraulic gradient to cause sand boiling in the stratum will be

a) 1.5   b) 1.25

c) 1.0   d) 0.75
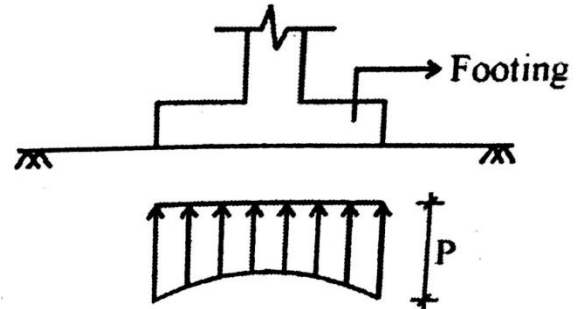
ans-(c)

62. As per soil classification system, silty sand is denoted by the symbol

a) SW   b) SP

c) SM   d) SC

ans-(c)

63. The figure given below represents the contact pressure distribution on underneath as

a) Rigid footing on saturated soil

b) Rigid footing on sand

c) Flexible footing on saturated clay

d) Flexible footing on sand

ans-(a)

64. Sheep foot roller is mostly used for compaction of which type of soils?

a) Clays   b) Sand

c) Gravel   d) Silt

ans-(a)

65. With an increase in the liquid limit, compression index

a) Increases

b) Decreases

c) Remains constant

d) May increase or decrease

ans-(a)

66. A soil sample has liquid limit as 45%, plastic limit as 25% and shrinkage limit as 14%. For a natural water content of 30%, The liquidity index of the soil will be

a) 75%   b) 80%

c) 25%   d) none of these

ans-(c)

67. The group efficiency of pile group:

a) Will be always less than 100%

b) Will be always greater than 100%

c) May be less than or more than 100%

d) Will be more than 100% for pile group in cohesionless soil and less than 100% for those in cohesive soils

ans-(b)

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68. The efficiency of sediment removal in a continuous sedimentation tank does not depend upon the:

   a) Discharge through the tank

   b) Width of the tank

   c) Length of the tank

   d) Depth of the tank

ans-(d)

69. Penman's equation is based on

   a) Energy budgeting only

   b) Energy budgeting and water budgeting

   c) Energy budgeting and mass transfer

   d) Water budgeting and mass transfer

ans-(c)

70. Which one of the following defines aridity index (AI)?

   a) AI = $\dfrac{PET - AET}{PET}$ X 100

   b) AI = $\dfrac{PET}{AET}$ X 100

   c) AI = $\dfrac{AET}{PET}$ X 100

   d) AI = $\dfrac{AET - PET}{AET}$ X 100

ans-(a)

71. A tropical cyclone in the northern hemisphere is a :

   a) Zone of low pressure with clockwise wind

   b) Zone of low pressure with anticlockwise wind

   c) Zone of high pressure with anticlockwise wind

   d) Zone of high pressure with clockwise wind

ans-(b)

72. Evapotranspiration is phenomenon of:

   a) Day   b) Night

   c) Land surface   d) A continuous surface

ans-(d)

73. For a crop, the consumptive use of water is equal to the depth of water

   a) Transpired by the crop

   b) Evaporated by the crop

   c) Transpired and evaporated by the crop

   d) Used by the crop in transpiration, evaporation and quantity of water evaporated due to adjoining soil

ans-(d)

74. Water logging is caused due to

   a) Inadequate drainage facilities

   b) Over irrigation and canal seepage

   c) Presence of impervious strata

   d) All of the above

75. Hydrodynamic pressure due to earthquake acts at a height of

   a) $4H/3\pi$ above the base

   b) $3H/4\pi$ above the base

   c) $3H/4$ below the water surface

   d) $4H/3\pi$ below the water surface

where H is the depth of water

ans-(a)

76. Pick up the incorrect statement from the following:

   a) Seepage drains reduce the chances of water logging

   b) Water-logging makes the land more productive

   c) Water-logging is caused due to over irrigation

   d) Excessive seepage from canal may cause water logging

ans-(b)

77. A deflecting groyne in a river is

   a) Inclined towards upstream

   b) Inclined towards downstream

   c) Perpendicular to the bank

   d) None of these

ans-(a)

78. A repelling groyne in a river is

a) Inclines towards downstream at 30°

b) Inclines towards upstream at 30°

c) Perpendicular to the bank

d) None of these

ans-(b)

79. Irrigation canals are generally aligned on

a) Ridge line

b) Contour line

c) Valley line

d) Straight line

ans-(a)

80. Salinity in soils

a) Increases crop yield

b) Reduces water-logging

c) Makes soil infertile

d) None of these

ans-(c)

81. Which one of the following, in a gravity dam , is the major resisting force?

a) Uplift pressure   b) Water pressure

c) Wave pressure   d) Self weight of dam

ans-(d)

82. Seepage through foundation in an earthen dam is controlled by providing

a) Rock toe   b) Horizontal blanket

c) Impervious cutoff d) Chimney drain

ans-(d)

83. In case of non-availability of space, due to topography, the most suitable spillway is

a) Straight drop spillway

b) Chute spillway

c) Shaft spillway

d) Ogee spillway

ans-(c)

84. "Economical height of a dam" is that height for which

a) Benefit-cost ratio is maximum

b) Net benefit is maximum

c) Cost per unit storage is minimum

d) Overall cost is minimum

ans-(c)

85. Which of the following trees yields hard wood?

a) Deodar   b) Chir

c) Shishum   d) Pine

ans-(c)

86. The moisture content in a well seasoned timber is

a) 4 to 6%   b) 10 to 12%

c) 15 to 20%   d) 100%

ans-(b)

87. Calculate the tensile strain developed in a rod of length of 100mm on application of an axial tensile load of 10kN. The final length of the rod after the application of the load is 100.1mm

a) 0.1   b) 0.01

c) 0.001   d) 0

ans-(c)

88. The relationship between Young's modulus(E), Bulk Modulus(K) and Poisson's ratio (μ) is given by:

a) $K=3E(1-2\mu)$ b) $E=3K(1-2\mu)$

c) $E=3K(1-\mu)$ d) $K=3E(1-\mu)$

ans-(b)

89. The deformation of a bar under its own weight as compared to that when subjected to a direct axial load equal to its own weight will be :

a) The same   b) One –fourth

c) Half   d) Double

ans-(c)

90. The material having direction dependent properties is called

a) Homogeneous   b) Isotropic

c) Non-homogeneous   d) Anisotropic

ans-(d)

91. When two mutually perpendicular principal stresses are unequal but like, the maximum shear stress is represented by

   a) The diameter of the Mohr's circle

   b) Half the diameter of the Mohr's circle

   c) One-third the diameter of the Mohr's circle

   d) One- fourth the diameter of the Mohr's circle

ans-(b)

92. The shape of the bending moment diagram of beam subjected to bending moment at the end of a cantilever beam is

   a) Triangle   b) Cubic parabola

   c) Parabola   d) Rectangle

ans-(d)

93. The maximum bending moment in a simply supported beam of length L loaded by a concentrated load W at the midpoint is given by

   a) WL   b) WL/2

   c) WL/4   d) WL/8

ans-(c)

94. At the point of contraflexure

   a) Bending moment is constant

   b) Bending moment is maximum or minimum

   c) Bending moment is zero

   d) Loading is constant

ans-(c)

95. By conjugate beam method, the slope at any section of an actual beam is equal to:

   a) EI times the SF of the conjugate beam

   b) EI times the BM of the conjugate beam

   c) SF of conjugate beam

   d) B.M of the conjugate beam

ans-(c)

96. When a rectangular section beam is loaded transversely along the length, shear stress develops on

   a) Top fibre of rectangular beam

   b) Middle fibre of rectangular beam

   c) Bottom fibre of rectangular beam

   d) Every horizontal plane

ans-(b)

97. From design point of view, spherical pressure vessels are preferred over cylindrical pressure vessels because they

   a) Are cost effective in fabrication

   b) Have uniform higher circumferential stress

   c) Uniform lower circumferential stress

   d) Have a larger volume for the same quantity of material used

ans-(d)

98. A structural member subjected to an axial compressive force is called

   a) Beam   b) Column

   c) Frame   d) Strut

ans-(d)

99. While calculating the stress induced in a closed coil helical spring, Wahl's factor must be considered to account for

   a) The curvature and stress concentration effect

   b) Shock loading

   c) Poor service conditions

   d) Fatigue loading

ans-(a)

100. Under axial load, each section of a close-coiled helical spring is subjected to

   a) Tensile stress and shear stress due to load

   b) Compressive stress and shear stress due to torque

   c) Tensile stress and shear stress due to torque

   d) Torsional stress and direct shear stresses

ans-(d)