18. Allowable tensile stress in mild steel plates for more than 20 mm thick is about (in MPa)

(*a*) 140 (*b*) 160

(*c*) 200 (*d*) 225

19. Area of cross-section of single rolled sections under tension to be considered for the calculation of the actual stress in design is

(*a*) Gross area

(*b*) Gross area less the area of rivet holes

(*c*) Minimum of the net areas

(*d*) Modified area

20. Area of cross-section of built up rolled angles to be taken into consideration in tensile steel members is

(*a*) area of both the legs of the angles

(*b*) net area of the legs connected by rivets

(*c*) net area of the legs connected by rivets plus some area of the outstanding legs

(*d*) none of the above

21. In pair of steel angles tack-riveted as a tension element, the net area considered for design criterion is equal to the

(*a*) gross area of the angles

(*b*) full area of one tack welded legs plus a small portion of the outstanding legs

(*c*) full area of the tack welded leg

(*d*) none of the above

22. Maximum deflection allowed in steel ties is

(*a*) $\frac{L}{750}$ (*b*) $\frac{L}{480}$

(*c*) $\frac{L}{350}$ (*d*) Unlimited

23. A steel wire when used as a tie requires

(*a*) pretensioning to its full capacity

(*b*) no prestressing

(*c*) prestressing to half its capacity

(*d*) nominally prestressing

24. Width of lacing bars used in steel ties should not be less than

(*a*) 75 mm

(*b*) three times the rivet hole

(*c*) four times the rivet hole

(*d*) one-fifteenth of the length of the bar

25. Angle of inclination of lacing bars in steel ties should be less than

(*a*) 70° (*b*) 50°

(*c*) 40° (*d*) 30°

26. A steel member which is subjected to primary tension is called

(*a*) Tie (*b*) Tie or beam

(*c*) Strut (*d*) Sling

27. Allowable direct tensile stress in structural steels is

(*a*) $0.45 f_y$ (*b*) $0.6 f_y$

(*c*) $0.66 f_y$ (*d*) $0.75 f_y$

28. In a tension member if one or more than one rivet holes are off the line, the failure of the member depends upon

(*a*) pitch

(*b*) diameter of rivet holes

(*c*) gauge

(*d*) all of the above

29. Lug angle is

(*a*) used with a single angle member

(*b*) used with a channel member

(*c*) not used with double angle member

(*d*) all of the above

30. A steel member which is subjected to primary tension is called

(*a*) Tie (*b*) Tie of beam

(*c*) Strut (*d*) Sling

31. The allowable direct tensile stress in structural steels in

(*a*) $0.45 f_y$ (*b*) $0.6 f_y$

(*c*) $0.66 f_y$ (*d*) $0.754 f_y$

where, f_y = yield or proof stress

32. Cables may be used effectively for

(*a*) Chimney

(*b*) Suspended roof

(*c*) Bridge

(*d*) All of the above

33. The best tension member section will be

(*a*) riveted single angle section

(*b*) welded single angle section

(*c*) double angle section on opposite side of gusset plate

(*d*) channel section

34. Limits are placed on slenderness ratio of tension members

(*a*) to check the crippling of member

(*b*) to limit the buckling of member

(*c*) to check the lateral vibration of the member

(*d*) to check crookedness of member

35. Tension member splice is designed for

(*a*) load on the member

(*b*) net strength of the member

(*c*) maximum calculated force

(*d*) none of the above

36. Minimum thickness of an element (other than the web) of steel compression member exposed directly to weather but which is not accessible is

(*a*) 3 mm (*b*) 4.5 mm

(*c*) 6 mm (*d*) 8mm

37. Effective outstanding leg in a steel compression member of I-section for design is

(*a*) Half of the nominal width of the flange

(*b*) Width of the flange

(*c*) Less than half of the nominal width of the flange

(*d*) None of the above

38. Effective width of outstand in compound steel columns for design purposes is equal to

(*a*) half of the flange width

(*b*) distance of the free edge from the rivet line

(*c*) distance of the free edge from the stiffener

(*d*) distance of the free edge to the nearest row of rivets

39. Maximum slenderness ratio of steel columns subjected to dead and live loads alone is

(*a*) 120 (*b*) 180

(*c*) 250 (*d*) 350

40. Which of the following is not a compression member ?

(*a*) strut (*b*) tie

(*c*) rafter (*d*) boom

41. Strut is a compression member which is

(*a*) small in length

(*b*) loaded lightly

(*c*) vertical or inclined

(*d*) all of the above

42. The best compression member section is

(*a*) Single angle section

(*b*) Double angle section

(*c*) I-section

(*d*) Tubular section

43. The best double angle section compression members is

(*a*) unequal angles with short legs connected

(*b*) unequal angles with long legs connected

(*c*) unequal angles on same side of gusset plate

(*d*) equal angles

44. The slenderness ratio of compression members is limited to account for

(*a*) the effect of accidental and construction loads

(*b*) they may be used as a walkway in braced roof truss system

(*c*) vibrations

(*d*) all of the above

45. The permissible stress in compression members is found from

(*a*) Rankine formula

(*b*) Secant formula

(*c*) Merchant Rankine formula

(*d*) Perry Robertson formula

46. Minimum number of battens required in a built up column are

(*a*) 2 (*b*) 3

(*c*) 4 (*d*) 6

47. Buckling load in a steel column is

(*a*) directly proportional to the slenderness ratio

(*b*) inversely proportional to the slenderness ratio

(*c*) related to the length

(*d*) non-linear by related to the slenderness ratio

48. Maximum deflection allowed in steel compression members in ordinary steel buildings as

(*a*) $\frac{L}{250}$ (*b*) $\frac{L}{325}$

(*c*) $\frac{L}{450}$ (*d*) $\frac{L}{540}$

Where, L = length of the member

49. Effective length in buckling of a steel column fixed at both ends is

(*a*) 0.5 L (*b*) 0.67 L

(*c*) L (*d*) 2 L

where L = length of the members

50. Effective buckling length of a steel angle connected by double rivets is

(*a*) 0.7 L (*b*) 0.85 L

(*c*) L (*d*) 1.3 L

where L = centre to centre distance of the rivets or welds

51. Lacing or battening of compound steel columns

(*a*) is a must

(*b*) increases the capacity

(*c*) decreases the buckling

(*d*) decreases local buckling

52. The overlap of batten bars in columns should be more than

(*a*) 4t (*b*) 6*t*

(*c*) $\frac{\text{Side of the column}}{20}$ (*d*) 45 mm

where t = thickness of the batten

53. Column bases of industrial buildings are mainly subjected to and designed for

(*a*) bending and compression

(*b*) compression and tension

(*c*) bearing and compression

(*d*) bearing and tension

54. Column bases are primarily designed as

(*a*) Plates (*b*) Bearings

(*c*) Studs (*d*) Columns

55. The slenderness ratio of a column is zero when

(*a*) its length is equal to the radius of gyration

(*b*) its length is half the radius of gyration

(*c*) total load carried is less than half the dead weight

(*d*) its length is supported on all sides throughout its full length

56. A circular column is generally not used because

(*a*) it is uneconomical

(*b*) it is difficult to connect beams to the round sections

(*c*) it cannot safely carry the load

(*d*) none of the above

57. In the secant formula for eccentrically loaded columns the value of ec/r^2 is

(*a*) 0.15 (*b*) 0.20

(*c*) 0.025 (*d*) 0.30

where, r = radius of gyration, and

c = eccentricity

58. Minimum width of lacing bar for 20 mm rivets, should be

(*a*) 40 mm (*b*) 60 mm

(*c*) 80 mm (*d*) 20 mm

59. Maximum axial load just sufficient to keep a column in a small deflected shape is called

(*a*) crippling load

(*b*) critical load

(*c*) buckling load

(*d*) all of the above

60. Battening is preferred when the

(*a*) column is axially loaded

(*b*) space between the two main components is not very large

(*c*) both (*a*) and (*b*) above

(*d*) none of the above

61. Allowable shear stress in stiffened webs of mild steel beams decreases with

(*a*) increase in spacing of stiffners

(*b*) decrease in spacing of stiffners

(*c*) depends on the effective

(*d*) none of the above

62. A truss which undergoes rigid body translation for an arbitrary load is called

(*a*) Determinate structure

(*b*) Satically unstable structure

(*c*) Geometrically unstable structure

(*d*) Structurally unstable structure

63. A truss is said to be statically determinate if

(*a*) Number of unknowns are less than the number of equilibrium equations

(*b*) Number of unknowns are equal to the number of equilibrium equations

(*c*) $2j - 3 = n$, where $n \neq$ number of members and j = number of joints

(*d*) None of the above

64. If A = area,

D = depth,

B = width,

L = effective length, and

r = radius of gyration of a member, the slenderness ratio is given by

(*a*) $\frac{\text{L}}{\text{D}}$ (*b*) $\frac{\text{L}}{\text{B}}$ for B < D

(*c*) $\frac{\text{L}}{r}$ (*d*) $0.85\frac{\text{L}}{r}$

65. Intermediate vertical stiffeners in plate girders are used to

(*a*) incraese the bending strength of web

(*b*) prevent local buckling of the flange

(*c*) prevent local buckling of the web

(*d*) none of the above

66. Horizontal stiffeners in plate girders are used to

(*a*) incraese the bending strength of web

(*b*) increase the shear capacity of the web

(*c*) prevent local buckling of the flange

(*d*) prevent local buckling of the web

67. Maximum spacing of the intermediate vertical stiffners in plate girders should be

(*a*) $3d$ (*b*) $1.5d$

(*c*) d (*d*) $0.5d$

where, d = depth of the web

68. Intermediate vertical stiffeners in plate girders need to be provided if the depth of the web exceeds

(*a*) $50t_w$ (*b*) $85t_w$

(*c*) $125t_w$ (*d*) $175t_w$

where t_w = thickness of the web

69. Thickness of web plate in plate girders, even with stiffeners, should never be less than

(*a*) 6 mm (*b*) 8 mm

(*c*) 10 mm (*d*) 12 mm

70. Bearing stiffeners in plate girders are used to

(*a*) decrease the effective depth of the web

(*b*) transfer the load from the top flange to the bottom flange

(*c*) prevent buckling of the web

(*d*) increase the bearing capacity of the flange

71. Atleast two horizontal stiffeners should be placed in a plate girder in which the thickness of the web is less than

(*a*) $\frac{d}{250}$ (*b*) $\frac{d}{200}$

(*c*) $\frac{d}{100}$ (*d*) $\frac{d}{50}$

where d = depth of the web

72. Percentage of the impact load with respect to the wheel load of an electrically-operated crane is about

(*a*) 5% (*b*) 15%

(*c*) 25% (*d*) 35%

73. Lateral force on the rail head from an EOT crane girder when compared with crab and lifting weight is

(*a*) 20% (*b*) 15%

(*c*) 10% (*d*) 5%

74. Longitudinal force on the rail head from a crane when compared with the wheel load is about

(*a*) 20% (*b*) 15%

(*c*) 10% (*d*) 5%

75. Impact factor of an EOT crane when compared with hand-operated cranes is

(*a*) less (*b*) equal

(*c*) more (*d*) less or equal

76. Minimum thickness of plate used in the fabrication of a steel chimney is about

(*a*) 8 mm (*b*) 10 mm

(*c*) 12 mm (*d*) none of the above

77. Additional thickness allowed for corrosion in a non-lined steel chimney is about

(*a*) 3mm

(*b*) 8 mm

(*c*) 10 mm

(*d*) 10% of the design thickness

78. Expansion joints are needed in the lining of steel chimney when lined with

(*a*) Fire bricks (*b*) Molar bricks

(*c*) Cellular concrete (*d*) Thermocole

79. Gantry girders are designed to resist

(*a*) lateral loads

(*b*) lateral and longitudinal loads

(*c*) longitudinal loads

(*d*) lateral, longitudinal and vertical loads

80. Distance between C.G. of compression flange and C.G., of tension flange of a plate girder is called

(*a*) effective depth (*b*) clear depth

(*c*) overall depth (*d*) none of the above

81. Bearing stifness in a plate girder is used to

(*a*) prevent buckling of the web

(*b*) transfer the load from top flange to the bottom flange

(*c*) prevent excessive deflection

(*d*) none of the above

82. Minimum thickness of web plate in plate girders even with stiffners should not be less than

(*a*) 4 mm (*b*) 6 mm

(*c*) 8 mm (*d*) 10 mm

83. Maximum spacing of vertical stiffners in plate girder should be

(*a*) 1.2*d* (*b*) 1.5*d*

(*c*) 2.0*d* (*d*) 3.0*d*

84. Vertical stiffners in plate girder is provided

(*a*) to increase bearing strength of web

(*b*) to prevent local buckling of the flange

(*c*) to prevent local buckling of the web

(*d*) none of the above

85. Economical depth of a plate girder is given by

(*a*) $\sqrt{\frac{M}{p \cdot t_w}}$ (*b*) $1.1\sqrt{\frac{M}{p \cdot t_w}}$

(*c*) $1.2\sqrt{\frac{M}{p \cdot t_w}}$ (*d*) $1.3\sqrt{\frac{M}{p \cdot t_w}}$

where, M = maximum moment in the plategirder,

p = allowable bending stress

t = thickness of web

86. The effective depth of end battens should be more than

(*a*) twice the flange width of component column

(*b*) the distance between the centre of gravity of the component members

(*c*) the *c*/*c* distance between inner end rivets

(*d*) both (*a*) and (*b*) above

87. When side sway in a framed column is not prevented, the value of reduction factor C_m is taken to be

(*a*) 0.6 (*b*) 0.85

(*c*) 1.0 (*d*) none of the above

88. Eccentrically loaded columns are generally subjected to

(*a*) axial compression and tension

(*b*) bending stress and axial compression

(*c*) shear stress and axial compression

(*d*) bending stress, shear stress and axial compression

89. For same load, unsupported length and end conditions, a laced column as compared to a battened column is

(*a*) stronger

(*b*) weaker

(*c*) equally strong

(*d*) cannot be compared

90. The design of long steel columns is done by trial and error because

(*a*) loads are in general eccentric

(*b*) such column have both the axial and bending stresses

(*c*) these have residual stresses

(*d*) none of the above

91. As per I.S. specifications, the beam sections should be

(*a*) at least symmetrical about one of the principal axes

(*b*) symmetrical about both the principal axes

(*c*) rolled to furnish maximum section modulus

(*d*) all of the above

92. Design of a beam is governed by shear

(*a*) when the depth of beam section is small and the beam is loaded uniformly

(*b*) when large concentrated loads are placed near beam supports

(*c*) both (*a*) and (*b*) above

(*d*) none of the above

93. Web crippling occurs due to

(*a*) column action of web

(*b*) failure of web under concentrated load

(*c*) excessive bending moment

(*d*) secondary bending moment

94. Angle sections when used as beam should be

(*a*) provided with the table in the tension

(*b*) provided with the table in compression

(*c*) provided along with lug angles

(*d*) disregarded

95. Deflection limitations over beams are imposed because excessive deflection

(*a*) may create problems for roof drainage

(*b*) may cause undesirable twisting and distortion of end connections

(*c*) may cause psychological problems for the users

(*d*) all of the above

96. Lintels in masonry walls are designed

(*a*) as laterally supported beams

(*b*) as laterally unsupported beams

(*c*) for maximum shear from the masonry above them

(*d*) none of the above

97. When the bearing stress in beam exceeds $0.75 f_y$
(*a*) the bearing block length is increased
(*b*) beams with thick web are used
(*c*) bearing stiffener is provided
(*d*) all of the above

98. Gantry girders are designed
(*a*) as laterally supported beams
(*b*) as laterally unsupported beams
(*c*) for a combination of vertical loads and either of the lateral and longitudinal force
(*d*) both (*a*) and (*b*) above

99. When gantry girders carry moving loads such as charging cars, etc. the deflection should not exceed
(*a*) $\frac{L}{500}$
(*b*) $\frac{L}{600}$
(*c*) $\frac{L}{750}$
(*d*) none of the above

100. In a plate girder flange, the angle section used should be
(*a*) equal angle
(*b*) unequal angle with long legs horizontal
(*c*) unequal angle with short legs horizontal
(*d*) a bulb angle

101. A rivetted plate girder is most suitable for spans
(*a*) < 10 m (*b*) 10–30 m
(*c*) > 30 m (*d*) up to 100 m

102. Welded plate girders weight less than riveted plate girders by about
(*a*) 0–10% (*b*) 5–15%
(*c*) 10–20% (*d*) 15–25%

103. For a plate girder
(*a*) at least $\frac{1}{3}$ rd of calculated flange area should be furnished by flange angles
(*b*) unequal angles with long legs horizontal should be provided as flanges
(*c*) the thickness of web when exposed to atmosphere should not be less than 8mm
(*d*) all of the above

104. In a plate girder
1. the flange cover plates should not be extended more than 20T beyond the outer line of connection.
2. unequal angles with long legs horizontal are preferred for making flanges.
3. the flange cover plate should not be thicker than the flange angle.

Of the above statements
(*a*) 1, 2 and 3 are correct
(*b*) only 1 is correct
(*c*) 2 and 3 are correct
(*d*) only 2 is correct

105. In a simply supported plate girder I.S. code recommends not to curtail the first cover plate over flange angles, to check
(*a*) buckling of flange cover plate
(*b*) local buckling of flange cover plate
(*c*) ingress of rain water to the connection leading to their corrosion
(*d*) none of the above

106. If a number of flange cover plates are provided in a riveted plate girder then the outer plates
(*a*) should not be thicker than the inner plates
(*b*) should not be thinner than the inner plates
(*c*) may be equal to the thickness of inner plates
(*d*) both (*a*) and (*c*) above

107. Bearing stiffener in a plate girder is designed
(*a*) for effective length equal to 0.7 times the actual length
(*b*) as straight compression member
(*c*) for bearing
(*d*) all of the above

108. In vertical stiffeners of plate girders
(*a*) a single angle section should be placed alternately on opposite side of web
(*b*) they are not subjected to any load
(*c*) they increase the buckling resistance of web
(*d*) all of the above

109. The connection of vertical stiffener to the web of plate girder are designed for
(*a*) shear force $\frac{125t}{h}$
(*b*) shear force $\frac{125t^2}{h}$
(*c*) moment $125\,t$
(*d*) moment $\frac{125t^2}{h}$ (per meter length)

110. Minimum thickness of a rectangular slab base is calculated from

(*a*) $t = \sqrt{\frac{M}{\sigma_{bs}}\left(a^2 - \frac{b^2}{4}\right)}$ (*b*) $t = \sqrt{\frac{3W}{\sigma_{bs}}\left(a^2 - \frac{b^2}{4}\right)}$

(*c*) $t = \sqrt{\frac{6M}{\sigma_{bs}}}$ (*d*) $t = \sqrt{\frac{6wa^2}{\sigma_{bs}}}$

where, σ_{bs} = permissible stress in slab base
W = unit bearing pressure from below the base
M = moment
a = cantilever portion of slab base

111. In design of grillage footing, the load from column is increased by 10% to account for

(*a*) unexpected vibrations
(*b*) impact loads
(*c*) self weight of the footing
(*d*) all of the above

112. Permissible bending stress in slab base ofyield stress (f_y) 250 N/mm^2

(*a*) 165 N/mm^2 (*b*) 185 N/mm^2
(*c*) 0.75 N/mm^2 (*d*) none of the above

113. Column bases subjected to an eccentric load will be designed as deep beam if

(*a*) $e \le \frac{L}{6}$ (*b*) $e > \frac{L}{3}$

(*c*) $e = \frac{L}{6}$ to $\frac{L}{3}$ (*d*) none of the above

114. For small height and wide industrial buildings, the ideal end conditions of column are

(*a*) fixed at bottom and wide hinged at top
(*b*) fixed at bottom as well as at top
(*c*) hinged at bottom as well as at top
(*d*) all of the above

115. The self weight of roof truss (N/m^2) may be obtained by

(*a*) $\frac{l}{3}+5$ (*b*) $\left(\frac{l}{3}+5\right)10$

(*c*) $\frac{l}{3}-5$ (*d*) $\left(\frac{l}{3}-5\right)10$

where l is the span of the truss.

116. For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then

(*a*) $t = p + r$ (*b*) $t = 2p + 3r$
(*c*) $t = p + 2r$ (*d*) $t = p + 3r$

117. As per I.S. code, purlins are designed as

(*a*) Simple beams
(*b*) Continuous beams
(*c*) Cantilever
(*d*) None of the above

118. The wind load on a steel truss for an industrial building will depend upon

(*a*) location of the structure
(*b*) shape of the structure
(*c*) location, shape and height of the structure
(*d*) shape and height of the structure

119. When the columns in industrial building are hinged at bottom

(*a*) size of the foundation is reduced
(*b*) knee brace may be provided at junction of column and truss
(*c*) column is extended and jointed to the chords of the truss
(*d*) all of the above

120. I-section purlins are subjected to

(*a*) uniaxial bending
(*b*) biaxial bending
(*c*) dead loads and wind load
(*d*) all of the above

121. Angle section purlin can be designed by I.S. code if the roof slope is less than

(*a*) 10° (*b*) 20°
(*c*) 30° (*d*) 32°

122. Sag rods are designed as

(*a*) compression members
(*b*) tension members
(*c*) laterally supported beams
(*d*) laterally unsupported beams

123. Transverse bracing of industrial building bent is provided

(*a*) to reduce end moments
(*b*) to resist lateral had due to wind
(*c*) to preclude collapse during erection
(*d*) both (*a*) and (*c*) above

124. Function of sway bracings is to

(*a*) stiffen the structure laterally
(*b*) to maintain rectangular cross-section
(*c*) both (*a*) and (*b*) above
(*d*) none of the above

125. In case of roof trusses

(*a*) Live loads for slopes ≤ 10 with no access should be taken as 1500 Nm^2 of plan area.

(*b*) For roof slope between 30° – 50°, snow loads may be neglected

(*c*) In buildings with normal permeability, the internal wind pressure of ± 0.2 p acts normal to roof.

(*d*) In building with normal permeability, the internal wind pressure of ± 0.5p acts vertical to roof

126. In rolled beam section, the presence of residual stresses produced by different rate of cooling of the web and flanges after rolling

(*a*) decreases the plastic moment

(*b*) increases the plastic moment

(*c*) increases the plastic moment and this increase depends on the ratio of the depth of section to the flange width

(*d*) does change the plastic moment

127. Shape factor for diamond section is

(*a*) 1.5 (*b*) 1.7

(*c*) 2 (*d*) $\frac{4}{\pi}$

128. Relation between load factor A, shape factor S and factor of safety *f* is

(*a*) $A = Sf$ (*b*) $\frac{A}{S^2} = f$

(*c*) $\frac{A}{f^2} = S$ (*d*) $S = Af$

129. When N is the number of possible plastic hinges and *r* is the degree of indeterminacy of structure, then the number of possible independent mechanisms N is given by

(*a*) $N + r$

(*b*) $2N + r$

(*c*) $2N - r$

(*d*) $N - r$

130. Which one is not an assumption in plastic analysis of steel structures ?

(*a*) A plane-section remains plane before and after bending

(*b*) The fabrication of steel structures is done in ductile steel

(*c*) Effects of axial load and shear force on a member are neglected

(*d*) Deflection are not checked

131. The plastic hinges formed in a collapse mechanism are 4 and the indeterminacy is 3. The collapse is

(*a*) Partial (*b*) Complete

(*c*) Overcomplete (*d*) None of the above

132. Minimum ratio of thickness of elements in compression, in terms of their outstanding length has been specified to prevent

(*a*) fracture (*b*) bending failure

(*c*) local buckling (*d*) tension failure

133. If the period of fundamental mode vibration of a building is low, it means that the building is

(*a*) durable (*b*) stiff

(*c*) weak (*d*) flexible

134. Which of the following cause(s) fatigue in structure;

1. Maximum stress
2. Residual stress
3. Large number of loading cycles
4. Wide range of stress variation

Select the correct answer using the codes given below.

Codes :

(*a*) 1 and 2 (*b*) 3 and 4

(*c*) 2, 3 and 4 (*d*) 1, 2, 3 and 4

135. The intensity of wind pressure is taken as

(*a*) directly proportional to wind velocity

(*b*) inversely proportional to wind velocity

(*c*) directly proportional to square of wind velocity

(*d*) inversely proportional to square of wind velocity

136. When the wheel loads while passing over the steel bridges are transferred to the level in between the top and bottom chord flanges, then such bridges are referred to as

(*a*) deck bridge (*b*) semi-deck bridge

(*c*) semi-through bridge (*d*) through bridge

137. The concept of factor of safety is to make the structure safe, because

(*a*) The analysis methods are based on assumptions and do not give the exact stresses

(*b*) Structural members may temporarily be overloaded under certain circumstances

(*c*) The secondary stresses may be appreciable

(*d*) All of the above

EXERCISE - II

(Questions From Previous SSC CPWD Exams)

2009

1. When slenderness ratio in a column lies between 32 to 120, it is known as

(*a*) Long column (*b*) Short column

(*c*) Medium column (*d*) Stocky column

2. If p and d are pitch and gross diameter of rivets, the efficiency η of the riveted joint, is given by

(*a*) $\eta = p/(p - d)$ (*b*) $\eta = (p - d)/p$

(*c*) $\eta = p/(p + d)$ (*d*) $\eta = (p + d)/p$

3. A column splice is used to increase

(*a*) Length of the column

(*b*) Strength of the column

(*c*) Cross-sectional area of the column

(*d*) None of the above

2010

4. Minimum pitch of rivets should not be less than how many times of gross diameter of rivet?

(*a*) 2 times (*b*) 2.5 times

(*c*) 3 times (*d*) 4 times

5. Effective throat thickness (t) and size of weld (S) are connected as

(*a*) $t = kS^2$ (*b*) $t = S^3$

(*c*) $t = kS$ (*d*) $t = k\sqrt{S}$

6. Bolts are most suitable to carry

(*a*) Shear (*b*) Bending

(*c*) Axial tension (*d*) Shear and bending

7. For a rivet of 36 mm diameter, the diameter of hold shall be taken as

(*a*) 37.5 mm (*b*) 36.0 mm

(*c*) 38.0 mm (*d*) 38.5 mm

8. What should be multiplied with permissible bearing stress to find out strength of rivet in bearing?

(*a*) $(p - d)t$ (*b*) $\frac{\pi}{4}d^2$

(*c*) $\frac{\pi}{2}d^2$ (*d*) dt^2

9. Pick the wrongly written assumption taken in analysis of riveted joints

(*a*) Friction in plate is negligible

(*b*) Uniform stress distribution in plates is not considered

(*c*) Bending moment is not taken into considered

(*d*) Total load on the joint is equally shared by all rivets

2011

10. The maximum allowable slenderness ratio for axially loaded member carrying tension only is

(*a*) 180 (*b*) 250

(*c*) 350 (*d*) 400

11. A strut is a

(*a*) tension member (*b*) compression member

(*c*) flexural member (*d*) torsion member

12. The effective slenderness ratio of laced columns, compared to actual maximum slenderness ratio shall be considered as

(*a*) 1.05 times (*b*) 1.10 times

(*c*) 1.15 times (*d*) 1.20 times

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

(*a*) $d = t$ (*b*) $d = 6.01\sqrt{t}$

(*c*) $d = 2t$ (*d*) $d = 2.6\sqrt{t}$

14. The lacing bars in steel columns should be designed to resist

(*a*) 0.5% of column load

(*b*) 1.5% of column load

(*c*) 2.5% of column load

(*d*) 3.5% of column load

2012

15. The allowable stress in a long column can be increased by increasing the

(*a*) Slenderness ratio (*b*) Length of the column

(*c*) Radius of gyration (*d*) Eccentricity

16. For a pin jointed plane structure to be statically determinate, the necessary condition is, where,

m = number of unknown member force

r = number of unknown reaction

j = number of joints

(*a*) $m + r = 2j$ (*b*) $3m + r = 2j$

(*c*) $m + r = 3j$ (*d*) $m + 2r = 3j$

17. If L is the effective length of a column and B is the least lateral dimension, then the column will be treated as short column if the ratio of L/B is equal to or less than

(*a*) 14 (*b*) 12

(*c*) 18 (*d*) 16

18. A slender section buckle locally
(*a*) after reaching yield moment
(*b*) as soon as it reaches ultimate
(*c*) before reaching yield moment
(*d*) as soon as it reaches yield moment

19. The slenderness ratio $\frac{l}{r}$ of a lacing bar should be less than
(*a*) 250 (*b*) 350
(*c*) 145 (*d*) 180

2013

20. If d be the diameter of MS or tor steel bars in mm, the standard weight (in kg) per metre of the bar is
(*a*) 0.00618 d^2 (*b*) 0.00618 d
(*c*) 0.00816 d^2 (*d*) 0.00816 d

21. The equivalent stiffness of two springs of stiffness S_1 and S_2 joined in series is given by S =
(*a*) $S_1 S_2/(S_1 + S_2)$ (*b*) $(S_1/S_2)/(S_1 + S_2)$
(*c*) $S_1 + S_2$ (*d*) $S_1 S_2$

22. The distance between two rivets measured perpendicular to the direction of applied force is known as
(*a*) pitch (*b*) gauge
(*c*) staggered pitch (*d*) edge distance

23. Maximum size of a fillet weld for a plate of square edge is
(*a*) 1.5 mm less than the thickness of the plate
(*b*) one-half of the thickness of the plate
(*c*) thickness of the plate itself
(*d*) 1.5 mm more than the thickness of the plate

24. The minimum edge and end distance from the centre of any hole to the nearest flame-cut edge shall ***not*** be less than
(*a*) 1.5 times hole dia
(*b*) 1.7 times hole dia
(*c*) 2 times hole dia
(*d*) 1.5 times bolt/rivet dia

2014

25. The size of a fillet weld is indicated by :
(*a*) Size of the plate
(*b*) Side of the triangle of fillet
(*c*) Throat of the fillet
(*d*) Length of fillet weld

26. In limit state method of design, for bars in compression the values of bond stress shall be.
(*a*) Decreased by 25%
(*b*) Increased by 20%
(*c*) Decreased by 20%
(*d*) Increased by 25%

27. A 40 cm diameter circular timber column is 4 m long. The slenderness ratio of the column is :
(*a*) $20\sqrt{2}$ (*b*) 10
(*c*) 20 (*d*) 40

28. The load factor applied to wind and seismic loads in design of steel structures is :
(*a*) 2.2 (*b*) 1.3
(*c*) 1.5 (*d*) 1.8

29. The purpose of stiffeners in a plate girder is to :
(*a*) prevent buckling of web plate
(*b*) reduce the shear stress
(*c*) take care of bearing stress
(*d*) increase the moment carrying capacity of the girder

30. As per IS : 800, the factor of safety adopted with respect to the yield stress of steels is
(*a*) 1.45 (*b*) 1.5
(*c*) 1.67 (*d*) 2.0

31. A tie is a
(*a*) tension member
(*b*) compression member
(*c*) flexural member
(*d*) torsion member

32. The slenderness ratio of lacing bars should ***not*** exceed
(*a*) 120 (*b*) 145
(*c*) 180 (*d*) 100

33. Bearing stiffeners are designed as
(*a*) beams (*b*) beam-ties
(*c*) ties (*d*) column

34. The maximum allowable slenderness ratio for members carrying compressive load due to during wind and seismic force only is
(*a*) 180 (*b*) 250
(*c*) 350 (*d*) 400

35. The throat in a fillet weld is
(*a*) large side of the triangle of the fillet
(*b*) hypotenuse of the triangle of the fillet
(*c*) smaller side of the triangle of the fillet
(*d*) perpendicular distance from the root the hypotenuse

36. The size of a rivet is identified by
(*a*) diameter of shank
(*b*) diameter of head
(*c*) length of shank
(*d*) shape of head

37. Horizontal stiffeners are needed in plate girders if the thickness of web is less than
(*a*) 6 mm (*b*) Depth/200
(*c*) Span/500 (*d*) Flange thickness

38. Permissible stress may also be known as
(*a*) ultimate stress (*b*) working stress
(*c*) limit stress (*d*) yield stress

39. The maximum permissible stress for power driven field rivet in bearing on rivet is
(*a*) 100 N/mm^2 (*b*) 250 N/mm^2
(*c*) 270 N/mm^2 (*d*) 300 N/mm^2

2015

40. The stiffness of a spring is
(*a*) load per coil of the spring
(*b*) load required to produce unit deflection
(*c*) load required to compress the spring up to shearing proportional limit
(*d*) the load required for breaking the spring

41. The total length of a cranked bar through a distance (d) at 45° in case of a beam of effective length L, and depth (d) is
(*a*) L + 0.42 d (*b*) L + 2 × 0.42 d
(*c*) L – 0.42 d (*d*) L – 2 × 0.42 d

42. The width of lacing bars in mm is kept
(*a*) twice the nominal rivet diameter
(*b*) thrice the nomial rivet diameter
(*c*) maximum of the all rounded to nearest 5 mm
(*d*) equal to normal rivet diameter

43. The bearing stress at bends for limit state method compared to working stress method of design is
(*a*) 1.5 times more (*b*) 2.5 times more
(*c*) 2.5 times less (*d*) 1.5 tims less

44. Partial safety factor on steel stresses is
(*a*) 1.67 (*b*) 1.15
(*c*) 1.77 (*d*) 1.5

45. In Brinell Hardness test, the type of indentor used is
(*a*) hard steel ball
(*b*) diamond cone
(*c*) mild steel ball
(*d*) hard steel cone

46. A column is known as medium size if its slenderness ratio is between
(*a*) 160 and 180 (*b*) 20 and 32
(*c*) 32 and 120 (*d*) 120 and 160

47. The sag tie in a truss is mainly used to reduce
(*a*) moment and deflection
(*b*) tension
(*c*) weight of the truss
(*d*) compression

48. The actual thickness of a butt weld when compared with the thickness of the plate is
(*a*) less (*b*) more or less
(*c*) more (*d*) equal

49. The fillet weld whose axis is parallel to the direction of the applied load is known as
(*a*) side fillet weld (*b*) end fillet weld
(*c*) flat fillet weld (*d*) diagonal fillet weld

50. Tacking rivets in compression plates exposed to weather have a pitch not exceeding 200 mm or
(*a*) 8 times the thickness of outside plate
(*b*) 16 times the thickness of outside plate
(*c*) 24 times the thickness of outside plate
(*d*) 32 times the thickness of outside plate

51. If the depth of the section of an upper column is much smaller than the lower column
(*a*) bearing plates are provided with column splice
(*b*) filler and bearing plates are provided with column splice
(*c*) filler plates are provided with column
(*d*) neither filler nor bearing plates are provided with column splice

52. Web crippling in beams generally occurs at the points where
(*a*) concentrated loads act
(*b*) bending moment is maximum
(*c*) shear force is maximum
(*d*) deflection is maximum

53. The minimum thickness of the plates used in pressed steel tanks is
(*a*) 4 mm (*b*) 5 mm
(*c*) 6 mm (*d*) 3 mm

54. A column splice is used to increase
(*a*) the strength of the column
(*b*) the rigidity of the column
(*c*) the cross-sectional area of the column
(*d*) the length of the column