CIVIL ENGINEERING PAPER 1 (MAY)
MAGDALINE COACHING CENTRE (mc²)

1. Modulus of rigidity is defined as the ratio of
a. Longitudinal stress to longitudinal strain
b. Shear stress to shear strain
c. Stress to strain
d. Stress to volumetric strain

2. Limit of proportionality depends upon
a. Area of cross-section
b. Type of loading
c. Type of material
d. All the above

3. For an isotropic, homogeneous and elastic material obeying Hooke's law, number of independent elastic constants is
a. 2
b. 3
c. 9
d. 1

4. If a material has identical properties in all directions, it is said to be
a. Homogeneous
b. Isotropic
c. Elastic
d. Orthotropic

5. If a composite bar of steel and copper is heated, then the copper bar will be under
a. Tension
b. Compression
c. Shear
d. Tension

6. Effective length of a weld is equal to
a. Overall length – weld size
b. Overall length – throat thickness
c. Overall length – 2 × weld size
d. Overall length – 2 × throat thickness

7. Weakest section in a fillet weld is
a. Throat of the fillet
b. Smallest side
c. Side parallel to force
d. Side perpendicular to force

8. If the rivet value is 16.8 KN and force in the member is 16.3 KN, then the number of rivets required for the connection of the member to a gusset plate is
a.1
b. 2
c. 3
d. 4

9. The radius of Mohr's circle for two equal unlike principal stresses of magnitude p is
a. p
b. p/2
c. Zero
d. None of the above

10. Shear stress on principal planes is
a. Zero
b. Maximum
c. Minimum
d. None of the above

11. According to Rankine's hypothesis, the criterion of failure of a brittle material is
a. Maximum principal stress
b. Maximum shear stress
c. Maximum strain energy
d. Maximum shear strain energy

12. Maximum bending moment in a beam occurs where,
a. Deflection is zero
b. Shear force is maximum
c. Shear force is minimum
d. Shear force changes sign

13. Rate of change of bending moment is equal to
a. Shear force
b. Deflection
c. Slope
d. Rate of loading

14. The variation of the bending moment in portion of a beam carrying linearly varying load is
a. Linear
b. Parabolic
c. Cubic
d. Constant

15. The relationship between the radius of curvature R, bending moment M and flexural rigidity EI is given by
a. $R=\frac{M}{EI}$
b. $\mathbf{M=\frac{EI}{R}}$
c. $EI=\frac{R}{M}$
d. $E=\frac{MI}{R}$

16. A portion of a beam between two sections is said to be in pure bending when there is
a. Constant bending moment and zero shear force
b. Constant shear force and zero bending
c. Constant bending moment and constant shear force

d. None of the above

17. Of the several prismatic beams of equal lengths, the strongest in flexure is the one having maximum
a. Moment of inertia
b. Section Modulus
c. Tensile strength
d. Area of cross-section

18. A prismatic bar when subjected to pure bending, assumes the shape of the
a. Catenary
b. Cubic parabola
c. Quadratic parabola
d. Arc of a circle

19. A beam of uniform strength has at every cross-section same
a. Bending moment
b. Bending stress
c. Deflection
d. Stiffness

20. For no torsion, the plane of bending should
a. be parallel to one of the principal axis.
b. Pass through shear centre of section
c. Pass through neutral axis of the section
d. Pass through centre of gravity of the section.

21. If the length of simply supported beam carrying a concentrated load at the centre is doubled, the deflection at the centre will become
a. Two times
b. Four times
c. Eight times
d. Sixteen times

22. Slenderness ratio of a 5 m long column hinged at both ends and having a circular cross-section with diameter 160 mm is
a. 31.25
b. 62.5
c. 100
d. 125

23. A solid circular shaft of 6 m length is built in at its ends and subjected to an externally applied torque 60 KN. m at a distance of 2 m from left end. The reactive torques at the left end and the right end are respectively
a. 20 KN. m and 40 KN. M
b. 40 KN. M and 20 KN. M
c. 15 KN. M and 45 KN. M
d. 30 KN. M and 30 KN. M

24. The radius of gyration of a circle of radius R is equal to
a. R/4
b. R/2
c. R
d. None of the above

25. A short column of external diameter of 250 mm and internal diameter of 150 mm carries an eccentric load of 1000 KN. The greatest eccentricity which the load can have without producing tension anywhere is
a. 20 mm
b. 31.25 mm
c. 37.5 mm
d. 42.5 mm

26. A compound bar consisting of material A and B is tightly secured at the ends. The co-efficient of thermal expansion of A is more than that of B. When the temperature is increased, the stresses induced will be
a. Tensile in both the materials
b. Tensile in material A and tensile in material B
c. Compressive in material A and tensile in material B
d. Compressive in both the material

27. In terms of bulk modulus (K) and modulus of rigidity (C), the poisson's ratio can be expressed as
a. $\frac{3K-4C}{6K+4C}$
b. $\frac{3K+4C}{6K-4C}$
c. $\boldsymbol{\frac{3K-2C}{6K+2C}}$
d. $\frac{3K+2C}{6K-2C}$

28. For a circular column having its ends hinged, the slenderness ratio is 160. The l/d ratio of the column is
a. 80
b. 57
c. 40
d. 20

29. Two closed-coil springs of stiffness S and 2S are arranged in series in one case and in parallel in the other case. The ratio of stiffness of springs connected in series to parallel is
a. 1/3
b. 1/9
c. 2/3
d. 2/9

30. Two closed thin vessels, one cylindrical and the other spherical with equal interval diameter and wall thickness are subjected to equal interval fluid pressure. The ratio of hoop stresses in the cylindrical to that of spherical vessels is
a. 4.0
b. 2.0
c. 1.0
d. 0.5

31. If the diameter of a shaft subjected to torque alone is doubled, then the horse power P can be increased to
a. 16 p
b. 8 p
c. 4 p
d. 2 p

32. A cast iron pipe of 1 m diameter is required to withstand a 200 m head of water. If the limiting tensile stress of the pipe material is 20 MPa, then the thickness of the pipe will be
a. 25 mm
b. 50 mm
c. 75 mm
d. 100 mm

33. For a given material, the modulus of rigidity is 100 GPa and poisson's ratio is 0.25. The value of modulus of elasticity in GPa is
a. 125
b. 150
c. 21
d. 25

34. A bar is subjected to an axial tensile stress. If the volumetric strain in the bar is 0.44 times the axial strain, what is the poisson's ratio of the material?
a. 0.44
b. 0.30
c. 0.28
d. None of these

35. A beam of rectangular cross-section is 100 mm wide and 200 mm deep. If the section is subjected to a shear force of 20 KN, the maximum shear stress is
a. 1 N/mm^2
b. 1.125 N/mm^2
c. 1.33 N/mm^2
d. 1.5 N/mm^2

36. A MS beam is subjected to a bending moment, such that a stress of 100 MPa is developed in a layer at a distance of 100 mm from the neutral layer. If E=200 GPa, what is the radius of curvature of the beam?
a. 400 m
b. 200 m
c. 100 m
d. 50 m

37. A thin cylinder contains fluid at a pressure of 500 N/m², the internal diameter of the shell is 0.6 m and the tensile stress in the material is to be limited to 9000 N/m². The shell must have a minimum wall thickness of nearly
a. 9 mm
b. 11 mm
c. 17 mm
d. 21 mm

38. A golden rule for procurement of construction store is that
a. Half of the construction stores should be at work site and half under procurement
b. Two-third of the construction stores be at work site and one-third under procurement
c. Three-fourth of the construction stores be at work site and one-fourth under procurement
d. Whole of construction stores should be at work sites.

39. The constructing works costing above rupees one lac are classified as
a. Mirror works
b. Major works
c. Projects
d. None of these

40. An Assistant Engineer may have powers upto rupees
a. twenty five thousand
b. one lac
c. two lac
d. five lac

41. When used in connection with the progress of a work, the term amount indicates the
a. Total expenditure on a particular item
b. Supplies made and services performed
c. Value of the finished product in a manufacturing operation
d. None of these

42. Military type of organisation is known as
a. Line organisation
b. Functional organisation
c. Line and staff organisation
d. None of these

43. The salient features of the organisation evolved by F.W Taylor is
a. Strict adherence to specification
b. Separation of planning and design part of field work
c. Each individual maintains functional efficiency
d. All the above

44. Time and progress chart are also known as
a. Bar chart
b. Modified milestone chart
c. Critical path method chart
d. All of these

45. The process of calculating the resource requirement of a project is known as
a. Scheduling
b. C0-ordinating
c. Resource aggregation
d. All of these

46. The chart which gives an estimate about the amount of materials handling between various work stations is known as
a. Flow chart
b. Process chart
c. Travel chart
d. Operation chart

47. A drawback of the bar chart is that
a. All the activity is independent of each other
b. It is difficult to judge whether an activity is complex or not
c. The sequence of activities is not clearly defined
d. All 0f the above

48. A milestone chart
a. Depicts the delay of jobs
b. Shows the inter dependence of various jobs
c. Shows the events in chronological, but not in a logical sequence
d. All of the above

49. The jobs going ahead of schedule are conveniently shown in
a. Gantt chart
b. Milestone chart
c. Pie chart
d. None of these

50. Travel charts are used to
a. Analyze material handling
b. Determine inventory control difficulties
c. Plan material handling procedures and routes
d. All of the above

51. The start or completion of task is called
a. An event
b. An activity
c. a duration
d. Any one of these

52. An activity is
a. The beginning or end of a specified job
b. An element of work entailed in the project
c. The movement of heavy vehicles from one place to another
d. The progress of work upto a certain limit.

53. Critical path method
a. helps in ascertaining time schedules
b. Makes better and detailed planning possible
c. Provides a standard method for communicating project plans, schedules time and cost performance
d. All of the above

54. Which of the following statement is correct?
a. When float of an activity is zero, it falls only on critical path
b. CPM technique is useful to minimize the direct and indirect expenses
c. Critical path of a net work represents the minimum time required for completion of project.
d. All of the above

55. In the critical path of construction planning, free float can be
a. Greater than total float
b. Equal to total float
c. Greater than independent float
d. Less than independent float

56. Which of the following is a dummy activity?
a. Excavation of foundation
b. Laying the foundation concrete
c. Awaiting the arrival of concrete material
d. Curing the foundation concrete

57. PERT
a. Provides an approach for keeping planning up to date.
b. Provides a way for management to require that planning to be done on a uniform and logical basis.
c. Permits management to foresee quickly the impact of variations from the plan.
d. All of the above

58. The total activity slack is equal to
a. Late start time – Early start time
b. Late finish time – Early finish time
c. Latest allowable event occurrence time – Early finish time
d. All of the above

59. The estimated time required to complete an activity is known as
a. Duration
b. Float
c. Restraint
d. All of the above

60. In a functional organisation
a. Quality of work is better
b. Wastage of waste is minimum
c. Specialised knowledge and guidance to individual worker is provided
d. All the above

61. In a line organisation
a. Discipline is strong
b. Quick decision is taken
c. Responsibility of each individual is fixed
d. All of the above

62. The construction of residential building are treated as
a. Light construction
b. Heavy construction
c. Industrial construction
d. None of these

63. An activity requires
a. Events
b. Resources
c. Time and resources
d. Energy

64. The essential condition for the decompression of an activity is that
a. The project time should change due to decompression
b. After decompression, the time of an activity invariably exceeds its normal time
c. An activity could be decompressed to the maximum extent of its normal time
d. None of the above

65. A Gantt chart indicates
a. Balance of work to be done
b. Efficiency of project work
c. Comparison of actual process with the scheduled progress
d. Progress cost of project

66. The bar chart is also known as
a. Flow chart
b. Time chart
c. Travel chart
d. Gantt chart

67. A bar chart is drawn for
a. Time versus activity
b. Activity versus resources
c. Resources versus progress
d. Progress versus time

68. Igneous rock has
a. Crystalline, glossy or fused texture
b. Foliated structure which is hard and durable
c. Layers of different composition, color and structure
d. None of the above

69. Laterite is chemically classified as
a. Calcareous rock
b. Argillaceous rock
c. Siliceous rock
d. Metamorphic rock

70. Gneiss is chemically classified as
a. Calcareous rock
b. Argillaceous rock
c. Siliceous rock
d. None of these

71. Which of the following is an example of argillaceous rock?
a. Kaolin
b. Slate
c. Laterite
d. All of these

72. Which of the following is an example of siliceous rock?
a. Granite
b. Gneiss
c. Quartzite
d. All of these

73. Marble is an example of
a. Aqueous rock
b. Metamorphic rock
c. Sedimentary rock
d. Igneous rock

74. Slate in the form of tiles is used
a. For paving
b. As road metal
c. As an excellent roof covering material
d. For the manufacture of cement

75. Granite is mainly composed of
a. Quartz and mica
b. Felspar and mica
c. Quartz and felspar
d. Quartz, felspar and mica

76. Sandstone consists of
a. Quartz and lime
b. Quartz and silica
c. Quartz, lime and silica
d. Silica, lime and alumina

77. The compressive strength of granite is
a. 50 to 70 MN/m²
b. 70 to 130 MN/m²
c. 130 to 170 MN/m²
d. 170 to 200 MN/m²

78. In order to dry the quarry sap of a freshly quarried stone, it should be exposed to open air for a period of
a. one month
b. four months
c. six to twelve months
d. two years

79. The specific gravity of stone should not, in any case, be less than
a. 1
b. 1.5
c. 2
d. 2.5

80. A good building stone is one which does not absorb more than _____ of its weight after one day's immersion
a. 5%
b. 10%
c. 15%
d. 25%

81. Which of the following statement is wrong?
a. A stone with large percentage of quartz is very soft
b. Quartz has a greasy luster
c. Felspar is a silicate of aluminum with varying amounts of potash, soda or lime
d. All of these

82. The colour of granite is
a. Grey
b. Green
c. Brown
d. All of these

83. A fine- grained granite
a. Offers higher resistance to weathering
b. Can be easily polished and worked
c. is used for exterior facing of buildings
d. All of these

84. A limestone found in seams of great thickness in non- crystalline texture with earthy appearance is called
a. Granular limestone
b. Compact limestone
c. Magnesium limestone
d. Kankar

85. The compressive strength of sandstone is
a. 40 MN/m²
b. 55 MN/m²
c. 65 MN/m²
d. 80 MN/m²

86. The specific gravity of sandstone is
a. 1.1 to 1.8
b. 1.8 to 2.65
c. 2.65 to 2.95
d. 2.95 to 3.4

87. The siliceous sandstone which has been subjected to metamorphic action, is called
a. Moorum
b. Laterite
c. Quartzite
d. Dolomite

88. For railway ballast, the stone should be
a. Soft with a uniform texture
b. Hard, heavy, strong and durable
c. Hard, tough, resistant to abrasion and durable
d. Hard, dense, durable, tough and easily workable

89. The quarrying of stone by the method of wedging is successfully carried out in
a. Sandstone
b. Limestone
c. Marbles
d. All of these

90. The most powerful explosive used in blasting is
a. Blasting power
b. Dynamite
c. Gun cotton
d. Cordite

91. The dressing of stone is done
a. immediately after quarrying
b. after seasoning
c. after three months of quarrying
d. just before building

92. The attrition test on stones is performed
a. to determine the crushing strength of the stone
b. for asserting the resistance of stone to the sun, rain, wind etc
c. to ascertain the stability of the stone when exposed to acid fumes
d. for determining the rate of wear of stone due to grinding action under traffic

93. Excess of alumina in the clay
a. Makes the brick brittle and weak
b. Makes the brick crack and warp on drying
c. Changes colour of the brick from red to yellow
d. Improves impermeability and durability of the brick

94. Excess of silica in the clay
a. Makes the brick brittle and weak
b. Makes the brick crack and warp on drying
c. Changes colour of the brick from red to yellow
d. Improves impermeability and durability of the brick

95. Which of the following constituent, when present in excess quantity in clay causes the bricks to melt and distort during burning?
a. Alumina
b. Silica
c. Lime
d. Alkalies

96. The alkaline salt present in the bricks, absorb moisture from the air which on drying
a. Leaves pores and makes the bricks porous
b. Leaves high powder deposit on the brick
c. Make the bricks brittle and weak
d. All of these

97. Efflorescence is caused if
a. The alkaline salt is present in the bricks
b. The clay used for making bricks contains pyrite
c. The water used for pugging the clay contains gypsum
d. All of the above

98. A continuous beam is deemed to be a deep beam when the ratio of effective span to overall depth (1/D) is less than
a. 1.5
b. 2.0
c. 2.5
d. 3.0

99. Minimum thickness of load bearing RCC wall should be
a. 50 mm
b. 100 mm
c. 150 mm
d. 200 mm

100. If the storey height is equal to length of RCC wall, the percentage increases in strength is
a. 0
b. 10
c. 20
d. 30

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101. Ratio of permissible stress in direct compression and bending compression is
a. Less than 1
b. Between 1 and 1.5
c. Between 1.5 and 2.0
d. Greater than 2

102. A higher modular ratio shows
a. Higher compressive strength of concrete
b. Lower compressive strength of concrete
c. Higher tensile strength of steel
d. Lower tensile strength of steel

103. The average permissible stress in bond for plain bars in tension is
a. Increased by 10% for bars in compression
b. Increased by 25% for bars in compression
c. Decreased by 10% for bars in compression
d. Decreased by 25% for bars in compression

104. In working stress design, permissible bond stress in the case deformed bars is more than that in plain bars by
a. 10%
b. 20%
c. 30%
d. 40%

105. The main reason for providing number of reinforcing bars at a support in a simply supported beam is to resist in that zone
a. Compressive stress
b. Shear stress
c. Bond stress
d. Tensile stress

106. Half of the main steel in a simply supported slab is bend up near the support at a distance of x from the centre of slab bearing where x is equal to
a. 1/3
b. 1/5
c. 1/7
d. 1/10

107. When shear stress exceeds the permissible limit in a slab, then it is reduced by
a. Increasing the depth
b. Providing shear reinforcement
c. Using high strength steel
d. Using thinner bars but more in number

108. The minimum cover to the ties or spirals should not be less than
a. 15 mm
b. 20 mm
c. 25 mm
d. 50 mm

109. For the design of retaining walls, the minimum factor of safety against over- turning is taken as
a. 1.5
b. 2.0
c. 2.5
d. 3.0

110. A T- shaped retaining wall mainly consists of
a. One cantilever
b. Two cantilevers
c. Three cantilevers
d. Four cantilevers

111. In counterfort retaining walls, the main reinforcement in the stem at support is
a. Not provided
b. Provided only on inner face
c. Provided only on front face
d. Provided both on inner and front face

112. In a counterfort retaining walls, the main reinforcement in the stem at mid span is
a. Front face only
b. Inner face only
c. both front face and inner face
d. None of the above

113. In a pile of length l, the point of suspension from ends for lifting it are located at
a. 0.207 l
b. 0.25 l
c. 0.293 l
d. 0.333 l

114. During erection, the pile of length l is supported by a crane at a distance of
a. 0.207 l
b. 0.293 l
c. 0.707 l
d. 0.793 l

115. While designing the pile as a column, the end conditions are nearly
a. both ends hinged
b. both ends fixed
c. One end fixed and other end hinged
d. One end fixed and other end free

116. The recommended value of modular ratio for reinforced brick work is
a. 18
b. 30
c. 40
d. 58

117. According to IS 1 recommendation, the maximum depth of stress block for balanced section of a beam of effective depth d is
a. 0.43 d
b. 0.55 d
c. 0.68 d
d. 0.85 d

118. According to Whitney's theory, ultimate strain of concrete is assumed to be
a. 0.03%
b.0.01%
c. 0.3%
d. 3%

119. According to Whitney's theory, depth of stress block for a balanced section of a concrete beam is limited to
a. 0.43 d
b. 0.537 d
c. 0.68 d
d. 0.85 d

120. The load factors for live load and dead load are taken respectively as
a. 1.5 and 2.2
b. 2.2 and 1.5
c. 1.5 and 1.5
d. 2.2 and 2.2

121. The creep strain is
a. Caused due to dead loads only
b. Caused due to live loads only
c. Caused due to both dead loads and live loads
d. Independent of loads

122. The effect of creep on modular ratio is
a. to decrease it
b. to increase it
c. Either to decrease or to increase it.
d. to keep it unchanged

123. Normally prestressing wires are arranged in the
a. Upper part of the beam
b. Lower part of the beam
c. Centre
d. Anywhere

124. Prestress loss due to friction occurs
a. Only in post- tensional beams
b. Only in pre- tensional beams
c. In both post- tensional and pre- tensional beams
d. None of the above

125. Which of the following has high tensile strength?
a. Plain hot rolled wires
b. Cold drawn wires
c. Heat treated rolled wires
d. all have same tensile strength

126. Ratio of compressive strength to tensile strength of concrete
a. Increases with age
b. Decreases with age
c. Remains constant
d. None of the above

127. According to Indian standards, the grading of fine aggregates is divided into
a. Two zones
b. Three zones
c. Four zones
d. Five zones

128. What is the adoptable maximum spacing between vertical stirrups in a RCC beam of rectangular cross- section having an effective depth of 300 mm?
a. 300 mm
b. 275 mm
c. 250 mm
d. 225 mm

129. What is the modular ratio to be used in the analysis of RC beams using working stress method if the grade of the concrete is M20?
a. 18.6
b. 13.3
c. 9.9
d. 6.5

130. If the permissible stress in steel is 140 N/mm², then the depth of neutral balanced section using working stress method is
a. 0.35 d
b. 0.40 d
c. 0.45 d
d. None of the above

131. For a continuous slab of 3m×3.5m size, the minimum overall depth of slab to satisfy the vertical deflection limit is
a. 5 cm
b. 7.5 cm
c. 10 cm
d. 12 cm

132. A deep continuous beam has effective depth of 500 mm and effective cover of 50 mm. Its maximum effective length is
a. 1375 mm
b. 1100 mm
c. 1274 mm

d. Cannot be determined.

133. The ratio of permissible shear stress in limit state method of design and working stress method of design is
a. 25:16
b. 5:4
c. 16:25
d. 4:5

134. An axially loaded column is of 300mm×300mm size. Effective length of a column is 3m. What is the minimum eccentricity of the axial load for the column?
a. 0
b. 10 mm
c. 16 mm
d. 20 mm

135. The load carrying capacity of a column designed by working stress method is 500 KN. The ultimate collapse load of the column is
a. 500 KN
b. 662.5 KN
c. 750 KN
d. 1100 KN

136. A strap footing is a special type of
a. Strip footing
b. Combined footing
c. Raft footing
d. Spread footing

137. Drop panel is a structural component in
a. Grid floor
b. Flat plate
c. Flat slab
d. None of the above

138. Minimum grade of concrete to be used in reinforced concrete is
a. M10
b. M15
c. M20
d. M25

139. If the thickness of thinnest outside plate is 10 mm, then the maximum pitch of rivets in tension will be taken as
a. 120 mm
b. 160 mm
c. 200 mm
d. 300 mm

140. If the thickness of plate to be connected by a rivet is 16 mm, then the suitable size of rivet as per Unwin's formula will be
a. 16 mm
b. 20 mm
c. 24 mm
d. 27 mm

141. Which one of the following is the mode of failure in a fillet weld material?
a. Tension
b. Shear
c. Bearing
d. Crushing

142. Which of the following does not describe a weld type?
a. Butt
b. Plug
c. Zig- Zag
d. Lap

143. A 6 mm thick mild steel plate is connected to an 8 mm thick plate by 16 mm diameter shop rivets. What is the number of rivets required to carry an 80 KN load?
a. 2
b. 3
c. 4
d. 6

144. For reversal of stresses, the most suitable bolt is
a. Black bolt
b. Friction grip bolt
c. Turned bolt
d. None of the above

145. For rivets in tension with countersunk heads, the tensile value shall be
a. Reduced by 25%
b. Reduced by 33.3%
c. Increased by 25%
d. None of the above

146. Tacking rivets in tension members are provided at a pitch in line not exceeding
a. 25 cm
b. 50 cm
c. 60 cm
d. 100 cm

147. The steel parts at right angles are welded with fillet weld of 10 mm size. The throat thickness of the fillet weld should be
a. 7 mm
b. 109 mm
c. 123 mm
d. 5 mm

148. Bolts are most suitable to carry
a. Shear
b. Bending
c. Axial tension
d. Shear and bending

149. Efficiency of a riveted joint having the minimum pitch as per IS:800 is
a. 40%
b. 50%
c. 60%
d. 70%

150. Steel of yield strength 400 MPa has been used in a structure. What is the maximum allowable tensile strength?
a. 240 MPa
b. 200 MPa
c. 120 MPa
d. 96 MPa

151. A steel plate is 300 mm wide and 10 mm thick. A rivet of nominal 18 mm is driven. The net sectional area of the plate is
a. 1800 mm²
b. 2805 mm²
c. 2820 mm²
d. 3242 mm²

152. If 20 mm rivets are used in lacing bars, then the minimum width of lacing bars should be
a. 40 mm
b. 60 mm
c. 80 mm
d. 100 mm

153. The slenderness ratio of lacing bars should not exceed
a. 100
b. 120
c. 145
d. 180

154. Which of the following is not a compression member?
a. Strut
b. Tie
c. Rafter
d. Boom

155. Two ISMC 400 are placed back to back at a spacing of 300 mm and carry an axial load of 160 KN. As per IS: 800 1984, its lacing system should be designed to resist a transverse shear of
a. 1.6 KN
b. 4.00 KN
c. 8 KN
d. 16.0 KN

156. Slenderness ratio for single angle single riveted strut should be less than
a. 180
b. 250
c. 300
d. 350

157. Lacing are subjected to
a. Transverse loading
b. Axial loading
c. Bending only
d. Shear force

158. Economic depth of plate girder corresponds to
a. Minimum weight
b. Minimum depth
c. Maximum weight
d. None of the above

159. For a wielded plate girder with vertical stiffness, what is the maximum depth of web provisionable in design when the thickness of the web plate is 5 mm?
a. 425 mm
b. 1000 mm
c. 1250 mm
d. 2000 mm

160. The depth of plate girder for long span is
a. 1/6 of span
b. 1/7 of span
c. 1/8 of span
d. 1/10 of span

161. As per IS: 800, the maximum bending moment for design of purlin's can be taken as
a. WL/6
b. WL/8
c. WL/10
d. WL/12

162. The external wind pressure acting on a roof depends on
a. Degree of permeability of roof
b. Slope of roof
c. both (a) and (b)
d. None of the above

163. In a truss design, snow load need to be considered when the roof is stepper than
a. 10°
b. 15°
c. 30°
d. 45°

164. The maximum permissible span of asbestos cement sheets is
a. 650 mm
b. 810 mm
c. 1250 mm
d. 1680 mm

165. What is the number of plastic hinges formed if an indeterminate beam with redundancy R is to become determinate?
a. R – 1
b. R
c. R + 1
d. R + 2

166. At the location of a plastic hinge
a. Radius of curvature is infinite
b. Curvature is infinite
c. Moment is infinite
d. Flexible stress is infinite

167. The plastic section modulus for a rectangular section of width b and depth d is
a. $bd^2/3$
b. $bd^2/4$
c. $bd^2/6$
d. $bd^2/12$

168. Which of the following conditions is to be satisfied both in elastic and plastic analysis?
a. Equilibrium condition
b. Yield condition
c. Mechanism condition
d. All of the above

169. IS: 800 2007 is based on
a. Elastic design method
b. Ultimate load method
c. Working stress method
d. Limit state method

170. The actual thickness of butt weld as compared to the thickness of plate is usually
a. More
b. Less
c. Equal
d. None of the above

171. The ratio of yield stress in tension to compression in mild steel is
a. Less than 1
b. Greater than 1
b. Equal to 1
d. None of the above

172. Independent displacement components at each joint of a rigid- jointed plane frame are
a. three linear movements
b. two linear movements and one rotation
c. one linear movement and two rotations
d. three rotations

173. If in a pin- jointed plane frame (m + r) > 2j, then the frame is
a. Stable and statically determinate
b. Stable and statically indeterminate
c. Unstable
d. None of the above

174. The number of independent displacement components at each joint of a rigid- jointed space frame is
a. 1
b. 2
c. 3
d. 6

175. The principle of virtual work can be applied to elastic system by considering the virtual work of
a. Internal forces only
b. External forces only
c. Internal as well as external forces
d. None of the above

176. Castigliano's first theorem is applicable
a. For statically determinate structures only
b. When the system behaves elastically
c. Only when the principle of superposition is valid
d. None of the above

177. The degree of static indeterminacy up to which column analogy method can be used is
a. 2
b. 3
c. 4
d. unrestricted

178. The deflection at any point of a perfect frame can be obtained by applying a unit load at the joint in
a. Vertical direction
b. Horizontal direction
c. Inclined direction
d. The direction in which the deflection is required

179. In the slope deflection equations, the deformations are considered to be caused by
a. Bending moment
b. Shear force
c. Axial force
d. None of the above

180. The three moments equation is applicable only when
a. the beam is prismatic
b. there is no settlements of supports
c. there is no discontinuity such as hinges within the span
d. the spans are equal

181. While using three moments equation, a fixed end of a continuous beam is replaced by an additional span of
a. Zero length
b. Infinite length
c. Zero moment of inertia
d. None of the above

182. Bending moment at any section in a conjugate beam gives in the actual beam
a. Slope
b. Curvature
c. Deflection
d. Bending moment

183. For a two- hinged arch, if one of the supports settles down vertically, then the horizontal thrust
a. is increased
b. is decreased
c. remains unchanged
d. becomes zero

184. For a symmetrical two hinged parabolic arch, if one of the supports settles horizontally, then the horizontal thrust is
a. is increased
b. is decreased
c. remains unchanged
d. becomes zero

185. The maximum bending moment due to a train of wheel loads on a simply supported girder
a. always occurs at centre of span
b. always occurs under a wheel load
c. never always occurs under a wheel load
d. None of the above

186. The elements of flexibility matrix of a structure
a. are dependent on the choice of a co-ordinates
b. are independent on the choice of a co-ordinates
c. are always dimensionally homogeneous
d. both (a) and (b)

187. Select the correct statement
a. Flexibility matrix is a square symmetrical matrix
b. Stiffness matrix is a square symmetrical matrix
c. both (a) and (b)
d. None of the above

188. Effects of shear force and axial force on plastic moment capacity of a structure are respectively to
a. increase and decrease
b. increase and increase
c. decrease and increase
d. decrease and decrease

189. The width of the analogous column in the method of column analogy is
a. 2/EI
b. 1/EI
c. 1/2EI
d. 1/4EI

190. The deformation of a spring produced by a unit load is called
a. Stiffness
b. Flexibility
c. Influence coefficient
d. Unit strain

191. In which of the following truss members the stress depends upon whether the load is moving on top chord or bottom chord?
a. top chord or bottom chord
b. Verticals
c. Diagonal
d. Verticals and diagonals

192. For approximate analysis of building frames under vertical loads, the point of inflection is assumed at
a. Centre of each beam
b. Centre of each column
c. One- tenth of the span length from each end of the beam
d. both (a) and (b)

193. A symmetrical two- hinged parabolic arch when subjected to a uniformly distributed load on the entire horizontal span is subjected to
a. Radial shear alone
b. Normal thrust alone
c. Normal thrust and bending moment
d. Normal thrust, radial shear and bending moment

194. A load 'W' is moving from left to right, support on a simply supported beam of span 'I'. The maximum bending moment at 0.4I from the left support is
a. 0.16 WI
b. 0.20 WI
c. 0.24 WI
d. 0.25 WI

195. If the sinking of a support of a fixed beam causes the beam to rotate in the clockwise direction, then the moments induced at both the ends of the beam will be
a. in anticlockwise direction and of equal magnitudes
b. in clockwise direction and of different magnitudes
c. In opposite directions and of equal magnitude
d. In opposite directions and of different magnitude

196. If M is the external moment which rotates the near end of a prismatic beam without translation (the far end being fixed), then the moment induced at the far end is
a. M/2 in same directions as M
b. M/2 in opposite directions as M
c. M in opposite direction
d. 0

197. The number of independent equations to be satisfied for static equilibrium in a space structure is
a. 2
b. 3
c. 4
d. 6

198. When a load crosses a through type Pratt truss in the direction left to right, the nature of force in any diagonal member in the left half of the span would
a. Change from compression to tension
b. Change from tension to compression
c. Always be compression
d. Always be tension

199. A fixed beam of uniform section is carrying a point load at its mid- span. If the moment of inertia of the middle half length is now reduced to half its previous value, then the fixed end moments will
a. Increase
b. Decrease
c. Remain constant
d. Change their direction

200. The maximum bending moment at the left quarter point of a simple beam due to crossing of UDL of length shorter than the span in the direction left to right would occur after the load has just crossed the section by
a. one- fourth of its length
b. half of its length
c. three- fourth of its length
d. its full length