1. Correct match of Column I (types of stones) with Column II (typesof work for which they are used) is

	Column I		Column II
P.	Marble	1.	damp-proofing, flooring, roofing, etc.
Q.	Slate	2.	Fire resistant masonry
R.	Limestone	3.	ornamental work, flooring, etc.
S.	Compact sandstone	4.	raw material for cement

(A) P-4, Q-1, R-2, S-3   (B) P-1, Q-4, R-2, S-3

(C) P-3, Q-1, R-4, S-2   (D) P-2, Q-1, R-4, S-3

2. Correct match of Column I (types of bricks) with Column II(properties or use) is

	Column I		Column II
P.	Ground-moulded bricks	1.	Also called stock bricks
Q.	Table-moulded bricks	2.	Irregular dimensions
R.	Machine-moulded bricks	3.	Used for decorative works
S.	Pressed bricks	4.	Also called wire-cut bricks

(A) P-4, Q-1, R-2, S-3   (B) P-1, Q-4, R-2, S-3

(C) P-3, Q-1, R-4, S-2   (D) P-2, Q-1, R-4, S-3

3. The total percentage of dicalcicum silicate and tricalcium silicate in all types of Portland cement is around

(A) 50%   (B) 60%   (C) 70%   (D) 90%

4. Correct match of Column I (types of cement) with Column II(properties or preparation) is

	Column I		Column II
P.	Portland pozzolana cement	1.	Ordinary Portland cement with less than 5% tricalcium aluminate
Q.	Sulphate-resistingPortland	2.	Contains 25 to 60% slag whichoffers

	cement		good sulphate resistance
R.	Portland slag cement	3.	Grinding the clinkers with oleic acid
S.	Hydrophobic cement	4.	Requires longer curing time than Ordinary Portland cement

(A) P-4, Q-1, R-2, S-3

(B) P-1, Q-4, R-2, S-3

(C) P-3, Q-1, R-4, S-2

(D) P-2, Q-1, R-4, S-3

5. The apparatus used for measuring soundness of cement is
   (A) Vicat's apparatus
   (B) Le Chatelier's apparatus
   (C) Briquette apparatus
   (D) Lechate apparatus

6. In Vicat's apparatus, the cross-sectional area of needle used is_____,and time to penetrate _____ is used to measure initial setting time of cement.
   (A) 1 mm^2, 33-35 mm
   (B) 10 mm^2, 20-25 mm
   (C) 1 mm^2, 0.5 mm
   (D) 5 mm^2, 5 mm

7. The main advantage of adding pozzolana in cement is
   (A) Longer life
   (B) Reduced cost and permeability of concrete
   (C) Slower setting time
   (D) Faster setting time

8. The main undesirable properties of concrete are:
   i) Undergoes shrinkage
   ii) Requires careful attention during manufacturing, placing, and curing
   iii) Has lower tensile strength
   iv) For equal load, cement members are heavier than steel members
   (A) i and iv only
   (B) i, ii, and iv only
   (C) i, ii, iii, and iv
   (D) ii, iii, and iv only

9. The Bureau of Indian Standards (BIS) has classified the common burnt clay bricks on the basis of
   (A) Compressive strength
   (B) size of the brick
   (C) Water absorption capacity
   (D) efflorescence on brick

10. Most of the stones possess the specific gravity in the range of
    (A) 1.0 to 1.5
    (B) 1.5 to 2.0
    (C) 2.4 to 2.8
    (D) 3.0 to 4.0

11. The lime which has the property of setting in water is known as

(A) fat lime   (B) hydraulic lime   (C) hydrated lime   (D) quick lime

12. The timber piece whose breadth and thickness exceeds 50 mm, but are less than 200 mm in length is called

(A) Pole   (B) Baulk   (C) Scantling   (D) Batten

13. _____ porcelain contains 70% to 90% silicate of magnesia

(A) Cordierite   (B) Zircon

(C) Carbon and graphite   (D) Steatic

14. The _____ in excess makes the cement unsound and causes the cement to expand and disintegrate

(A) Silica   (B) Alumina

(C) Magnesia   (D) Lime

15. Which test measures the stability of Self-Compacting concrete (SCC)

(A) J-Ring   (B) L-Box

(C) V-funnel   (D) Column / Probe segregation

16. Loss of strength of cement stored in bags in godowns for 3 months is about

(A) 30%   (B) 50%   (C) 15%   (D) 0%

17. Vanadium steel is normally used in the manufacture of

(A) axle and springs   (B) ball bearings

(C) magnets   (D) railway switches and crossings

18. Before testing setting time of cement one should test for

(A) soundness   (B) strength

(C) fineness   (D) consistency

19. Complimentary shear stresses are the shear stresses acting on a set of planes which are

(A) having zero normal stress   (B) having maximum normal stress

(C) at an angle of 45° to each other   (D) orthogonal to each other

20. Bulk modulus K is defined as a ratio of

    (A) Direct stress to volumetric strain

    (B) Volumetric stress to direct strain

    (C) Young's modulus to volumetric strain

    (D) Direct stress to torsional strain

21. Modulus of Rigidity G can be expressed in usual notations as

    (A) $E / 2(1 + \mu)$ (B) $E / 2(1 + 2\mu)$

    (C) $2E / (1 + \mu)$ (D) $2E / (1 + \mu)$

22. In a uniaxial tension test on a mild steel bar, the Lueders' line will be

    (A) Inclined at 45° to the direction of tensile stress applied

    (B) Perpendicular to the direction of tensile stress applied

    (C) Along the direction of tensile stress

    (D) Perpendicular to the resultant compressive stress

23. Bulk Modulus (K), Young's Modulus (E) and Poisson's Ratio (m) are related by

    (A) $K = E/3(1 - 2/m)$ (B) $E = K/3(1 + 2/m)$

    (C) $E = 2K(1 + 1/m)$ (D) $E = 3K(1 - 2m)$

24. A plate 100 mm wide, 10 mm thick is having a hole of diameter 10 mm symmetrical about the axis of the plate. The plate is subjected to a force of 9 kN. The maximum stress on a section passing through centre of the hole will be

    (A) 10 N/mm^2 (B) $>10 \text{ N/mm}^2$ (C) $< 9 \text{ N/mm}^2$ (D) 9 N/mm^2

25. A rectangular section 100 mm × 200 mm is subjected to moment of 20 kNm. The maximum bending stress is

    (A) 30 N/mm^2 (B) 576 N/mm^2 (C) 10000 N/mm^2 (D) 300 N/mm^2

26. A cantilever AB is subjected to a concentrated load at the free end. The slope and deflection at the free end are $WL^2/2 \text{ EI}$ and $WL^3/3 \text{ EI}$. If the same load is applied at mid-span point, thedeflection at the free end will be

    (A) $5 \text{ WL}^3/384 \text{ EI}$ (B) $5 \text{ WL}^3/48 \text{ EI}$ (C) $WL^3/6 \text{ EI}$ (D) $WL^3/16 \text{ EI}$

27. The maximum shear stress produced in a shaft is 5 N/mm^2. The shaft is of 40 mm diameter.The value of twisting moment is

    (A) 628 Nm   (B) 62.8 Nm   (C) 125.6 Nm   (D) 1256 Nm

28. When a shaft of diameter d is subjected to a bending moment M and torque T, the equivalentB. M. is given by

(A) $\dfrac{M + \sqrt{M^2 + T^2}}{2}$

(B) $\dfrac{M - \sqrt{M^2 + T^2}}{2}$

(C) $\dfrac{16}{\pi d^3} M + \sqrt{M^2 + T^2}$

(D) $\dfrac{32}{\pi d^4} M + \sqrt{M^2 + T^2}$

29. A pull of 20 t is suddenly applied to a rod of cross-sectional area 40 cm². The stressproduced in the rod is equal to

(A) 0.5 t/cm²   (B) 1.0 t/cm²   (C) 2.0 t/cm²   (D) 4 t/cm²

30. Let the strains produced in length and diameter of the cylindrical rod be α and β respectively. Then the volumetric strain is given by

(A) $\alpha + 2\beta$ (B) $\alpha + \beta$ (C) $\alpha - \beta$ (D) $\alpha - 2\beta$

31. The location of shear centre of the channel section shown below is
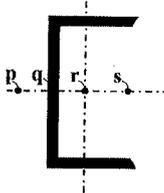
(A) p   (B) q   (C) r   (D) s

32. Section modulus of Hollow Circular Section having external Dia. (D) and internal Dia. (d) is

(A) $\pi (D\text{-}d)^4 /32$ (B) $\pi (D^4\text{-}d^4)/36D$ (C) $\pi (D^4\text{-}d^4)/32D1$ (D) $\pi (D\text{-}d)^4 /36$

33. Choose the correct option classifying the following structure.
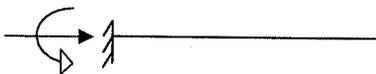
(A) Indeterminate to 1st degree   (B) Indeterminate to 2nd degree
(C) Determinate   (D) Unstable

34. Moment area method is best suitable for finding
(A) Slope & deflection of cantilever beam
(B) Slope & deflection of continuous beam
(C) Deflection of simply supported beam
(D) Slope of fixed beam

35. Slope deflection method is suitable for analysis of

    (A) Continuous beam   (B) Simply supported beam

    (C) Fixed beam   (D) Cantilever beam

36. For undamped free vibrations, the natural frequency is given in usual notation by

    (A) $\sqrt{\dfrac{m}{k}}$ (B) $\sqrt{\dfrac{k}{m}}$ (C) $\sqrt{\dfrac{2k}{m}}$ (D) $\sqrt{\dfrac{k}{m}}$

37. Modulus of elasticity (E) is defined in terms of bulk modulus (K) and poisson's ratio (1/m) as

    (A) $3K \left(1 + \dfrac{2}{m}\right)$ (B) $3K \left(1 - \dfrac{1}{m}\right)$

    (C) $3K \left(1 - \dfrac{2}{m}\right)$ (D) $3K \left(1 - \dfrac{m}{2}\right)$

38. For the beam of span L, carrying UVL as shown in figure, the maximum bending moment is
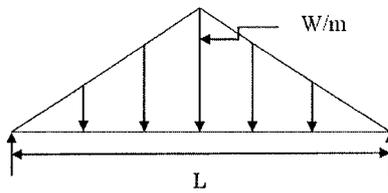
    (A) $\dfrac{WL^2}{8}$ (B) $\dfrac{WL^2}{12}$ (C) $\dfrac{WL^2}{10}$ (D) $\dfrac{WL^2}{4}$

39. For a cantilever beam of span L carrying uniformly distributed load, won its entire span, the maximum bending moment is _____

    (A) $\dfrac{WL^2}{2}$ (B) $\dfrac{WL}{2}$ (C) $\dfrac{WL^2}{4}$ (D) $\dfrac{WL^2}{8}$

40. What is maximum bending moment for beam shown in figure?
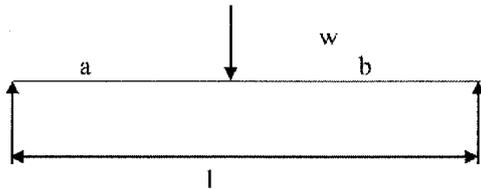
    (A) $\dfrac{wba^2}{l^2}$ (B) $\dfrac{wab}{l}$ (C) $\dfrac{wab^2}{l^2}$ (D) $\dfrac{wa^2b^2}{l^2}$

41. The equation of pure bending in usual notation is

(A) $\dfrac{M}{R} = \dfrac{E}{y} = \dfrac{f}{I}$

(B) $\dfrac{M}{y} = \dfrac{E}{I} = \dfrac{f}{R}$

(C) $\dfrac{M}{I} = \dfrac{E}{R} = \dfrac{f}{y}$

(D) $\dfrac{M}{R} = \dfrac{E}{I} = \dfrac{f}{y}$

42. Which of the following represents the shear force at a section of the beam?

(A) $EI(d^4y/dx^4)$ (B) $EI(d^3y/dx^3)$ (C) $EI(d^2y/dx^2)$ (D) $EI(dy/dx)$

43. A rectangular section has dimensions of 10 cm x 20 cm. The ratio of the moment of inertiaabout x-axis passing through its centroid to the moment of inertia about y-axis passingthrough its centroid is equal to

(A) 8   (B) 4   (C) 6   (D) 2

44. Maximum deflection at mid-span of a simply supported beam with UDL is

(A) $WL^3/48EI$ (B) $5WL^3/48EI$ (C) $5WL^4/384EI$ (D) $5WL^4/48EI$

45. Deflection of simply supported beam at mid-span under a concentrated load is

(A) $WL^3/48EI$ (B) $WL^2/8EI$ (C) $WL^3/3EI$ (D) $WL^3/96EI$

46. Which of the following is not the displacement method?

(A) Equilibrium method

(B) Column analogy method

(C) Moment distribution method

(D) Kani's method

47. Two shaft of different diameter d_1 and d_2 are made from same material and are of same length under the action of same torque T the ratio of strain energy V_1/V_2

(A) $[d_2/d_1]^3$ (B) $[d_1/d_2]^2$ (C) $[d_2/d_1]^2$ (D) $[d_2/d_1]^4$

48. Two people weighing W each are sitting on a plank of length L floating on water at L/4 from either end. Neglecting the weight of the plank, the bending moment at the centre of the Plank is

(A) WL/8   (B) WL/16   (C) WL/32   (D) zero

49. What is the value of Maximum effective slenderness ratio (KL/r) for a compression flange of beam against lateral torsional buckling?

    (A) 180   (B) 250   (C) 300   (D) 350

50. What is the value of Maximum effective slenderness ratio (KL/r) for a member carrying compression loads resulting from dead loads and imposed loads only?

    (A) 180   (B) 250   (C) 300   (D) 350

51. Partial Safety Factor (r_{m0}) for field welds is _____.

    (A) 1.25   (B) 1.50   (C) 1.00   (D) 2.00

52. In design of steel structures using Working Stress method of design, the factor of safety (FOS) is applied to _____.

    (A) Loading

    (B) Yield stress of material

    (C) Sectional properties of the members

    (D) Safe bearing capacity (SBC) of soil

53. What is the Buckling class for hollow cold formed Sections as per IS:800-2007?

    (A) Buckling Class a   (B) Buckling Class b

    (C) Buckling Class c   (D) Buckling Class d

54. To account for shear deformation effects in battened columns, the ratio of the effective slenderness ratio $(KL/r)_e$ to the maximum actual slenderness ratio $(KL/r)_0$ of column is to be considered as

    (A) More than 1   (B) 1.0   (C) 0.5   (D) 0.1

55. The effective slenderness ratio for laced column shall be _____ times the maximum actual slenderness ratio to account for shear deformations.

    (A) 1.5   (B) 2.5   (C) 0.75   (D) 1.05

56. In case of hot rolled steel section, a beam with a series of regular openings in its web is called _____.

    (A) Tapered Beam   (B) Hybrid Beam

    (C) Castellated Beam   (D) Latticed Beam

57. Minimum spacing of vertical stiffeners in plate girder of depth d is limited to _____.

    (A) d/4   (B) d/3   (C) d/2   (D) 2d/3

58. For commonly used HSFG bolts (IS1367 part-3, grade 8.8) yield stress f_{yb} is

    (A) 280 N/mm^2 (B) 360 N/mm^2 (C) 640 N/mm^2 (D) 940 N/mm^2

59. The minimum size of the fillet weld that can be used is

    (A) 2 mm   (B) 3 mm   (C) 4 mm   (D) 5 mm

60. For a tension member, the design shear capacity of bolts carrying shear through packingplate in excess of 6 mm shall be decreased by a factor of (Note: t_{pk} is the thickness of thethicker packing plate)

    (A) 1-0.125 t_{pk} (B) 1-0.0125 t_{pk} (C) 1-0.250 t_{pk} (D) 1-0.0250 t_{pk}

61. If the effective length of a prismatic compression member is 0.8 L, then the support conditionsshould be (Note: L is the unsupported length)

    (A) At one end both rotation and translation is restrained, whereas at the other end translation is restrained, but the rotation is free

    (B) At both ends both translation and rotation are restrained

    (C) At both ends translations are restrained but rotations are free

    (D) At one end translation is restrained while at the other end rotation is restrained

62. The thickness of battens shall be

    (A) 1/10thof effective length of batten

    (B) 1/15thof effective length of batten

    (C) 1/10thof the distance between the innermost connecting lines of rivets, bolt or welds

    (D) 1/15thof the distance between the innermost connecting lines of rivets, bolt or welds

63. If an industrial building is cover by GI sheet and if no snowfall is expected in that area, then the minimum pitch should be

    (A) 1/24thof span   (B) 1/6thof span   (C) 1/12thof span   (D) 1/4thof span

64. The collapse load for a propped cantilever of span l subjected to uniformly distributed load is

    (A) 0.414 M_p/l   (B) 0.586 M_p/l   (C) 7.67 M_p/l   (D) 11.656 M_p/l

65. Economical depth of plate girder corresponds to

(A) minimum weight

(B) minimum depth

(C) maximum weight

(D) minimum thickness of web

66. In a steel plate with bolted connections, the rupture of the net section is a mode of failure under

(A) Tension   (B) Compression   (C) Flexure   (D) Shear

67. The standard clearance in diameter and width of slots for 20 mm nominal size of fastener is

(A) 1 mm   (B) 2 mm   (C) 3 mm   (D) 4 mm

68. Minimum percentage of steel reinforcement for HYSD bars in walls,slabs and roofs of water retaining concrete structure as specified byIndian Standards is

(A) 0.2%   (B) 0.24%   (C) 0.40%   (D) 0.12%

69. Storey drift in any storey shall not exceed _____ times the storey height under the effect of design   base shear applied as per IS 1893-2016.

(A) 0.004   (B) 0.002   (C) 0.008   (D) 0.001

70. For simply supported prestressed concrete beam having uniformly distributed load on its entire   span the pre stressing tendon has themaximum eccentricity at

(A) The supports

(B) The centre having maximum moment

(C) The quarter points

(D) The section having maximum shear

71. In a tensile test on a concrete cylinder, tensile strength of concrete canbe obtained by the formula   in usual notations as _____.

(A) $P/\pi D$ (B) $2P/\pi^2 LD$ (C) $P/\pi LD$ (D) $2P/\pi LD$

72. The maximum percentage of tension reinforcement in beam shall not exceed _____ of cross sectional area as per IS:456-2000.

(A) 0.15%   (B) 2.00%   (C) 4.00%   (D) 0.12%

73. Maximum spacing of vertical stirrups permitted in RC beam having depth D is _____ .

    (A) 0.75 D   (B) 2.0 D   (C) 0.5 D   (D) 0.25 D

74. Modular ratio (m) for concrete can be calculated as _____ .

    (A) $250/\sigma_{cbc}$ (B) $280/3\sigma_{cbc}$ (C) $280/\sigma_{cbc}$ (D) $250/3\sigma_{cbc}$

75. In nominal mix of concrete designated by 1:2:4, the values indicates the proportion of
    (A) Course aggregate : Fine aggregates : Cement
    (B) Cement : fine aggregates : coarse aggregates
    (C) Cement : water : aggregates
    (D) Aggregates : cement : water

76. For moderate exposure, the minimum nominal cover to reinforcement to meet durability requirements as specified by IS 456-2000 is
    (A) 50 mm   (B) 30 mm   (C) 75 mm   (D) 20 mm

77. The minimum percentage of tension reinforcement in R.C.C. beams is
    (A) $\nless 85 / f_y$ (B) $\nless 6$ (C) $\nless 4$ (D) $\nless 0.4b_s / 0.87f_y$

78. The maximum diameter of the reinforcement bars in R.C.C. beam is limited to (#)
    (A) 28 mm
    (B) 40 mm
    (C) one-eighth of the least dimension of the beams
    (D) one-tenth of the depth of beams

79. A column is regarded as long column if the ratio of its effective length to least lateral radiusof gyration is more than
    (A) 150   (B) 100   (C) 60   (D) 40

80. The minimum percentage of longitudinal reinforcement in R.C.C. column is
    (A) 6   (B) 0.8   (C) 1.2   (D) 4

81. Normally counter forts in a retaining wall are spaced at an interval of
    (A) > 2m   (B) 1/3 to 1/2 of the height of the wall
    (C) 2 times the height of the wall   (D) 4.5 m to 5.5 m

82. The loss of stress with the time at constant strain is called

    (A) relaxation   (B) creep   (C) shrinkage   (D) ductility

83. Flexural strength (f_{cr} in N/mm^2) of concrete is computed by

    (A) $5000\sqrt{f_{ck}}$ (B) $7000\sqrt{f_{ck}}$ (C) $0.7\sqrt{f_{ck}}$ (D) $0.5\sqrt{f_{ck}}$

84. Maximum area of compression reinforcement for beams is

(A) 0.04bD
(B) 0.85bd/f$_y$
(C) 0.1 percent of web area
(D) 0.5 percent of web area

85. As per IS 1893:2002, dynamic analysis shall be performed for regular buildings of height greater than _____ m in zones IV

(A) 50
(B) 40
(C) 45
(D) 60

86. A RCC slab under mild exposure condition having main longitudinal tensile reinforcement of diameter 12 mm, then minimum allowable nominal cover to satisfy durability requirement is

(A) 10mm
(B) 15mm
(C) 20mm
(D) 25mm

87. As per IS 456:2000, the permissible limit for sulphates in water is

(A) 200 mg/l
(B) 3000 mg/l
(C) 400 mg/l
(D) 2000 mg/l

88. Spacing of longitudinal bars measured along the periphery of the column shall not exceed

(A) 200 mm
(B) 250 mm
(C) 300 mm
(D) 350 mm

89. Submerged unit weight is based on principle of

(A) Darcy
(B) Terzaghi
(C) Archmedis
(D) Reynolds

90. The admixture of sand or silt to clay causes

(A) Decrease in liquid limit and increase in plasticity index
(B) Decrease in liquid limit and no change in plasticity index
(C) Decrease in both liquid limit and plasticity index
(D) Increase in both liquid limit and plasticity index

91. The coefficient of permeability of a soil is 4 × 10^{-5}cm/sec for a certain pore fluid. If theviscosity of the pore fluid is reduced to half, then the coefficient of permeability will be

(A) 4 × 10^{-5}cm/sec
(B) 8 × 10^{-5}cm/sec
(C) 2 × 10^{-5}cm/sec
(D) 16 × 10^{-5}cm/sec

92. The hydraulic head that would produce a quick condition in a sand stratum of thickness of 2 m, if G = 2.7 and e = 0.7, is

(A) 0.5   (B) 2   (C) 1   (D) 2.5

93. Piping occurs when

(A) Effective stress is zero   (B) Flow is downwards

(C) Flow is upwards   (D) Flow is horizontal

94. The quantity of seepage depends on which of the following statements?

1. The coefficient of permeability

2. The differential head across the flow path

3. The length of flow path

(A) 1 and 2   (B) 1, 2 and 3   (C) 1 and 3   (D) 2 and 3

95. Secondary consolidation is

(A) Caused by hydrodynamic lag

(B) Caused by creep

(C) Large for the pressures below the pre consolidation pressure

(D) Very small for highly plastic clays and organic clays

96. Self-healing concrete is a product

(A) that will be self compacting after casting

(B) that will biologically produce limestone to heal cracks that appear on the surface of concrete structures

(C) that will conserve the moisture to prevent shrinkage cracks

(D) that will provide ductility to concrete when subjected to tension

97. Extradosed bridges combine the characteristics of

(A) Suspension bridge with cantilever

(B) Cable-stayed bridges with conventional box girder bridges

(C) Suspension bridge with cable stayed bridge

(D) Girder bridge with tall towers connecting cables.

98. Which of the following is not a property of high performance concrete?

(A) High early strength   (B) High abrasion resistant

(C) High modulus of elasticity   (D) High permeability

99. Which of the following is not the characteristic of green building?

(A) Use of natural light and ventilation

(B) Solar PV Panels at roof

(C) Roof top rainwater harvesting

(D) Use of material with high thermal conductivity

100. Polyvinyl chloride (PVC) is a

(A) thermosetting material   (B) thermoplastic material

(C) elastoplastic material   (D) rigid - plastic material