1. The neutral axis of a T-beam

(A) always passes through the web of the beam

(B) always passes through the flange of the beam

(C) always passes through the junction of flange and web

(D) always passes through anywhere in the section

2. As per IS-456 : 2000, the maximum number of steps in flight of a staircase should be restricted to

(A) 10

(B) 12

(C) 14

(D) 16

3. In an isolated reinforced column footing of effective depth $d$, the stress in punching shear is checked

(A) at the centre of the column

(B) at a distance $d$ from the face of the column

(C) at a distance $2d$ from the face of the column

(D) at a distance $d/2$ from the face of the column

4. As per IS-456 : 2000, the highest value of $s/d$ ratio can be found in case of

(A) continuous slab spanning in one direction

(B) continuous slab spanning in two directions

(C) cantilever slab

(D) simply supported slab

5. The maximum value of strain in concrete at the outermost compression fibre in the limit state design as per IS-456 : 2000 is

(A) 0·0002

(B) 0·0005

(C) 0·0035

(D) 0·00953

6. If the diameter of a rivet body is $D$, then the diameter of its pan head is

(A) $1{\cdot}4D$

(B) $2{\cdot}5D$

(C) $1{\cdot}6D$

(D) $2D$

7. The effective length of fillet weld is

(A) total length – 2 × weld size

(B) total length – weld size

(C) total length – 2 × throat thickness

(D) total length – throat thickness

8. The moment of inertia of a rectangular section 4 cm × 6 cm about its NA is

(A) 24 $cm^4$

(B) 36 $cm^4$

(C) 144 $cm^4$

(D) 72 $cm^4$

9. A simply supported beam of length 4·0 m carries uniformly distributed load of 3 kN/m over the entire length. The value of maximum bending moment will be

(A) 6 kN-m

(B) 12 kN-m

(C) 36 kN-m

(D) 48 kN-m

10. A member with cross-section $A$ mm$^2$ is subjected to a load 1 N. If its length is 1·0 m and Young's modulus is $E$ N/mm$^2$, the linear strain will be

(A) $\frac{1}{AE}$ N/mm

(B) $\frac{A}{E}$ N/mm$^2$

(C) $\frac{1}{AE}$ mm/mm

(D) $\frac{A}{AE}$ mm/mm

11. The Euler's formula used for calculating buckling load in a column will not be valid if the slenderness ratio is less than

(A) 160

(B) 120

(C) 100

(D) 80

12. Gauge pressure is

(A) atmospheric pressure + absolute pressure

(B) atmospheric pressure − vacuum pressure

(C) absolute pressure − atmospheric pressure

(D) None of the above

13. A body in neutral equilibrium will rotate about its

(A) centre of gravity and centre of buoyancy

(B) centre of gravity and meta-centre

(C) centre of pressure and meta-centre

(D) centre of gravity, metacentre and centre of buoyancy

14. A rectangular section will be most economical when the ratio of its depth of flow and width of bottom is

(A) 1 : 4

(B) 2 : 1

(C) 1 : 2

(D) 4 : 1

15. A strut is a member which

(A) connects two points

(B) is subjected to compressive load predominantly

(C) is subjected to shear force predominantly

(D) is subjected to bending moment and shear force along with any axial force

16. The number of reaction components possible at hinge or roller support is

(A) 0

(B) 1

(C) 2

(D) 3

17. At the point of contraflexure, which of the following statements is correct?

(A) SF changes sign.

(B) BM changes sign.

(C) Both SF and BM are 0.

(D) It occurs at the supports.

18. The name of cross-drainage work when a canal runs below the natural drain is

(A) super passage

(B) aqueduct

(C) level crossing

(D) siphon aqueduct.

19. The minimum elongation of high-strength deformed bar of grade Fe550 as per IS : 13920–2016 is

(A) 15·5%

(B) 23·5%

(C) 22·5%

(D) 14·5%

20. A cantilever beam of length 2·0 m carries udl @ 2·0 kN/m. The SF at its fixed end is

(A) 0

(B) 2 kN

(C) 4 kN

(D) 4 kN-m

21. An earthquake-resistant building should have

(A) strong beam and strong column

(B) weak beam and weak column

(C) weak beam and strong column.

(D) strong beam and weak column

22. Lap splicing of reinforcement bars in beam should not be within

(A) a joint

(B) a quarter of the length of the beam

(C) a distance twice the diameter of the bar from the face of the column

(D) All of the above

23. The fineness of cement can be tested by

(A) air content method

(B) air permeability method.

(C) water content method

(D) Vicat apparatus

24. Efflorescence of bricks is due to

(A) high porosity of bricks

(B) high water absorption of bricks

(C) soluble salt present in bricks.

(D) overburning of bricks

25. The window provided on the sloping roof of a building is called as

(A) slope window

(B) bay window

(C) dormer window.

(D) gable window

26. Which one of the following treatment sequences is followed to prepare potable water from turbid surface water?

(A) Turbid surface water—Coagulation—Sedimentation—Flocculation—Filtration—Disinfection—Storage and supply

(B) Turbid surface water—Coagulation—Filtration—Sedimentation—Flocculation—Disinfection—Storage and supply

(C) Turbid surface water—Coagulation—Flocculation—Sedimentation—Filtration—Disinfection—Storage and supply

(D) Turbid surface water—Coagulation—Flocculation—Sedimentation—Disinfection—Filtration—Storage and supply

27. Consider the following activities in a building construction :

I. Concreting of roof slab

II. Cement slurry over roof slab

III. Placing of reinforcement

IV. Centering and shuttering

The correct sequence of the activities is

(A) I—II—III—IV

(B) III—II—I—IV

(C) IV—III—I—II

(D) III—II—IV—I

28. A frame has 6 sides with 4 joints. The frame is a

(A) redundant frame

(B) deficit frame

(C) perfect frame

(D) None of the above

29. Match List—I with List—II :

| *List—I* | | *List—II* |
|---|---|---|
| P. Hooke's law | 1. | Stress and strain |
| Q. Bending moment | 2. | Euler's formula |
| R. Bending stress | 3. | Moment of resistance |
| S. Column and strut | 4. | Sagging and hogging |

Choose the correct option.

| | P | Q | R | S |
|---|---|---|---|---|
| (A) | 3 | 4 | 2 | 1 |
| (B) | 4 | 2 | 1 | 3 |
| (C) | 1 | 4 | 3 | 2 |
| (D) | 3 | 1 | 4 | 2 |

30. An experiment was done on orifice. The values of coefficient of contraction ($C_c$) and coefficient of velocity ($C_v$) were reported as 0·6 and 0·9 respectively. The value of coefficient of discharge ($C_d$) will be

(A) 0·54

(B) 0·62

(C) 0·67

(D) 0·96

31. Direct shear test is mainly used to determine the value of

(A) cohesion and specific gravity of soil

(B) angle of internal friction and permeability of soil

(C) cohesion and compaction of soil

(D) cohesion and angle of internal friction of soil

32. The plate load test in field is mainly used to determine the

(A) ultimate bearing capacity of soil

(B) ultimate shear strength of soil

(C) net shear strength of soil

(D) condition of soil structure

33. Standard Proctor test is used in soil mechanics laboratory to determine the

(A) minimum moisture content and minimum dry density

(B) optimum moisture content and maximum dry density

(C) optimum moisture content and minimum dry density

(D) optimum effect at optimum moisture content

34. As per BIS, the maximum Los Angeles abrasion value of stone aggregate is

(A) 60%

(B) 50%

(C) 40%

(D) 30%

35. The void ratio of a given soil mass is defined as the ratio of

(A) volume of voids to the total volume of soil mass

(B) volume of voids to the total weight of soil mass

(C) volume of voids to the volume of solids in soil mass

(D) volume of voids to the weight of soil mass

36. If the void ratio of a soil sample is 0·5, its porosity will be

(A) 50%

(B) 33·33%

(C) 66·67%

(D) 48·33%

37. In a laboratory test of certain soil sample, the volumes of liquid limit ($W_1$) and plastic limit ($W_2$) are found to be 25% and 12% respectively. The value of plasticity index will be

(A) 13%

(B) 37%

(C) 18·5%

(D) 30%

38. The coefficient of permeability of a soil sample is $4 \times 10^{-5}$ cm/s for a certain pore fluid. If the viscosity of the pore fluid is reduced to half, then the coefficient of permeability will be

(A) $2 \times 10^{-5}$ cm/s

(B) $16 \times 10^{-5}$ cm/s

(C) $8 \times 10^{-5}$ cm/s

(D) $4 \times 10^{-5}$ cm/s

39. The phenomenon when the sand loses its shear strength due to oscillatory motion is known as

(A) liquefaction

(B) quicksand

(C) plastic sand

(D) All of the above

40. Inclined grain size distribution curve shows

(A) narrow-range grain sizes

(B) wide-range grain sizes

(C) uniform grain sizes

(D) certain range of missing grain sizes

41. Per capita water demand is measured in litres per

(A) hour

(B) day

(C) month

(D) year

42. Light-reflecting devices used to guide the driver along the proper alignment are called

(A) delineators

(B) reflectors

(C) rumble strips

(D) litter bins

43. As per IRC, in two-lane hilly road, the maximum ruling gradient is

(A) 2%

(B) 3%

(C) 5%

(D) 10%

44. The best example of rigid pavement is

(A) gravel road

(B) concrete road

(C) WBM road

(D) bituminous road

45. Out of the following tests, which one is carried out to know the resistance of flow of the given bituminous material?

(A) Penetration

(B) Viscosity

(C) Softening point

(D) Ductility

46. Gradual introduction of super-elevation is facilitated by the introduction of a

(A) reverse curve

(B) compound curve

(C) zig-zag curve

(D) transition curve

47. According to IRC : 73-1980, the width of pavement or carriageway for double lane without kerb is equal to

(A) 4·0 m

(B) 5·5 m

(C) 7·0 m

(D) 7·5 m

48. Out of the following, which one is not used as a coagulant for treatment of water?

(A) Nitrogen dioxide

(B) Ferric chloride

(C) Ferrous sulphate

(D) Aluminium sulphate

49. The thickness of rapid sand filter for water treatment is

(A) 15 cm–19 cm

(B) 20 cm–39 cm

(C) 55 cm–59 cm

(D) 60 cm–75 cm.

50. The permissible pH value for public water supply plant is

(A) 3·5–5·5

(B) 5·6–6·5

(C) 6·6–8·5

(D) 8·6–10·5

51. High dose of alum increases

(A) acidity in water

(B) hardness in water

(C) carbonate in water

(D) sulphate in water

52. BOD is an indirect measure of

(A) dissolved solids

(B) volatile acid content

(C) organic matter

(D) non-organic matter

53. The coliform organism in 100 mL of drinking water should not be more than

(A) 1

(B) 100

(C) 250

(D) 500

54. The backsight reading on the floor of a tunnel is 1·5 m and the foresight reading taken on an inverted staff from the ceiling of the tunnel is 2·5 m. The height of the tunnel is

(A) 1·0 m

(B) 1·5 m

(C) 2·5 m

(D) 4·0 m

BS = 1.5m
FS → 2.5

55. The surveying, in which curvature of the Earth is taken into consideration, is called

(A) traversing

(B) plane surveying

(C) geodetic surveying

(D) reciprocal surveying

56. The magnetic bearing of the Sun at noon is observed as 178°. Then the magnetic bearing of a line *AB* is observed to be 72°40′. The true bearing of the line *AB* is

(A) 70°40′

(B) 74°40′

(C) 72°40′

(D) 68°40′

57. The temporary adjustments of a theodolite include

I. setting of theodolite over the station

II. levelling up of telescope

III. elimination of parallax

IV. adjustment of axis of telescope parallel to line of collimation

Choose the correct option.

(A) I and II only

(B) I and IV only

(C) I, II and IV

(D) I, II and III

58. A horizontal angle that a line makes with the true meridian through one of the extremities of the line is called

(A) bearing

(B) true bearing

(C) magnetic bearing

(D) declination

59. At the equator of the Earth, the amount of dip is

(A) 0°

(B) 180°

(C) 270°

(D) None of the above

60. The following data were obtained while conducting the liquid limit test. What will be the plastic limit?

| *Number of blows* | 8 | 20 | 25 | 32 | 45 |
|---|---|---|---|---|---|
| *Water content (%)* | 70 | 65·2 | 56·8 | 51·6 | 45·8 |

(The plastic index of the soil is 26·8)

(A) 19% (B) 38·4%

(C) 25% (D) 30%

61. Presence of excess silica in brick earth results in

(A) loss of cohesion

(B) enhancing the impermeability of bricks

(C) cracking and warping of bricks

(D) developing crack and warp on drying

62. Natural bed of stone in stone masonry should be

(A) kept parallel to the load line.

(B) kept 45° to 65° to the load line.

(C) kept normal to the load line.

(D) irrespective of the load line.

63. Radial splits of timber originating from bark and narrowing towards the pith are known as

(A) heart shakes.

(B) cup shakes.

(C) star shakes.

(D) knots.

64. When cement is tested for setting time, on gauging it shows quick setting. This phenomenon known as flash set of cement is due to the presence of high

I. tricalcium aluminate ($C_3A$) in cement.

II. alkalis in cement.

III. tricalcium silicate ($C_3S$) in cement.

Choose the correct option.

(A) I, II and III

(B) I and II only.

(C) II and III only

(D) I and III only

65. The fineness modulus and bulking of fine sand bear

(A) no relationship.

(B) direct exponential relationship.

(C) direct relationship.

(D) inverse relationship.

66. In sieve analysis test of a soil sample, the summation of cumulative % of soil retained in each sieve is found to be 300. The fineness modulus (FM) of the sample will be

(A) 30.

(B) 3.

(C) 0·3.

(D) 0·03.

67. The standard cube mould size for compressive strength test for cement is

(A) 100 mm × 100 mm × 100 mm.

(B) 150 mm × 150 mm × 150 mm.

(C) 70·6 mm × 70·6 mm × 70·6 mm.

(D) 70 mm × 70 mm × 70 mm.

68. The most commonly used admixture which prolongs the setting and hardening time of concrete is

(A) gypsum.

(B) calcium chloride

(C) sodium silicate

(D) fly ash

69. The maximum % of water absorption by weight of first-class bricks, when kept in water for 24 hours, is

(A) 10%

(B) 15%

(C) 20%

(D) 25%

70. Which of the following instruments is not used in setting perpendicular line to a chain line?

(A) Optical square

(B) Cross-staff

(C) Prism square

(D) Folding staff

71. Which of the following instruments is used for measuring area of any figure?

(A) Odometer

(B) Clinometer

(C) Planimeter

(D) None of the above

72. When a brick is cut off lengthwise, the cutoff part is called

(A) queen closure.

(B) king closure

(C) bat

(D) corbel

73. The standard weight of one cubic metre Fe 450 is

(A) 2850 kg

(B) 5850 kg

(C) 7850 kg

(D) 8850 kg

74. Pitot tube is used to measure

(A) discharge of liquid at a point

(B) velocity of liquid at a point

(C) energy of liquid at a point

(D) pressure of liquid at a point

75. In case of a rectangular channel of width 1·5 m and depth 1·0 m, the value of wetted perimeter is

(A) 3·5 m

(B) 4·0 m

(C) 5·0 m

(D) 1·5 m

76. The capacity of a bathtub is 1100 L. If its length and breadth are 2·0 m and 1·0 m, the water depth in the tub will be

(A) 0·35 m

(B) 0·45 m

(C) 0·50 m

(D) 0·55 m

77. The continuity equation of fluid flow deals with the law of conservation of

(A) mass.

(B) energy

(C) momentum

(D) force

78. For turbulent flow, the Reynolds' number should be more than

(A) 3000

(B) 4000.

(C) 2000

(D) 5000

79. AADT is

(A) total traffic in a day

(B) total traffic of a month/28, 29 or 30

(C) total traffic of a year/365 or 366.

(D) total traffic of a month/(365 or 366) × 24

80. The grade compensation that can be provided for BG track at a 4% curvature will be

(A) 0·12%

(B) 0·08%

(C) 0·20%

(D) 0·16%.

81. A revised estimate is prepared when initially sanctioned estimate is likely to be exceeded due to the change in material quantities or rates by

(A) 2·5%

(B) 5%.

(C) 7·5%

(D) 10%.

82. In specification of earthwork in foundation trenches, drains, etc., the normal lead is specified as

(A) 120 m

(B) 90 m

(C) 60 m

(D) 30 m.

83. The number of modular bricks required per $m^3$ of brickwork is

(A) 350

(B) 500.

(C) 450

(D) 400

84. While submitting tender, the contractor is required to deposit some amount as guarantee of the tender which is known as

(A) earnest money.

(B) caution money

(C) bank guarantee

(D) security deposit

85. The critical path moves along the activities having the total float

(A) positive

(B) negative

(C) zero

(D) one

86. The intensity of irrigation means

(A) percentage of CCA to be irrigated

(B) percentage of mean CCA to be irrigated

(C) percentage of GCA to be irrigated

(D) percentage of NCA to be irrigated

87. If the duty is 1200 ha/cumec and base period is 120 days for an irrigated crop, then the delta in metre is

(A) 10

(B) 0·01

(C) 0·864

(D) 144

88. Sullage means

(A) wastewater from toilets

(B) drainage water from roadside drains

(C) industrial disposal

(D) wastewater from bathrooms

89. Cowl is provided

(A) for ornamental look

(B) for quick disposal of foul gas

(C) to prevent entry of rainwater

(D) to prevent entry of debris

90. The gas responsible for depletion of ozone layer is

(A) $CO_2$

(B) $NO_2$

(C) CFC

(D) $NH_3$

91. In hydrostatics, which of the following statements is false?

(A) Hydrostatic equations are valid for uniform flow.

(B) Pressure is in all directions.

(C) Normal stress is exactly equal to pressure.

(D) Shear stress is always zero.

92. Original cost of a property minus depreciation is known as

(A) obsolete value

(B) saleable value

(C) salvage value

(D) book value

93. A hydrograph is a plot of

(A) precipitation vs. time

(B) stream flow or discharge vs. time

(C) rainfall vs. time

(D) runoff vs. time

94. Flow irrigation is also known as

(A) sprinkler irrigation

(B) gravity irrigation

(C) pumped irrigation

(D) well irrigation

95. The property of fresh concrete, in which water in the concrete tends to rise to the surface while it is vibrated, is known as

(A) bleeding

(B) curing

(C) surface tension

(D) capillary action

96. As per IS-456 : 2000, the maximum area of reinforcement provided in tension zone of a beam shall not exceed ($b$ = width, $d$ = effective depth and $D$ = overall depth of the beam)

(A) $0{\cdot}4bd$

(B) $0{\cdot}4bD$

(C) $0{\cdot}04bD$

(D) $0{\cdot}04bd$

97. As per IS-456 : 2000, the slenderness ratio of a rectangular column is

(A) less than 12

(B) greater than 12

(C) less than 24

(D) greater than 24

98. Nearly how many bags of cement are there in one cubic metre of cement?

(A) 32

(B) 30

(C) 28

(D) 31

99. In simply supported beam, the effective span should be least the distance between the centre-to-centre of the supports plus

(A) half of the effective depth of the beam

(B) half of the width of the beam

(C) width of the beam

(D) effective depth of the beam

100. In RCC beam, the minimum distance between two parallel main reinforcement bars shall be

(A) less than the size of the coarse aggregates

(B) greater than the maximum size of the coarse aggregates

(C) 10 mm greater than the minimum size of the coarse aggregates

(D) 5 mm greater than the maximum size of the coarse aggregates