1. Effects of shear force and axial force on plastic moment capacity of a structure are respectively

   (A) Increase and decrease

   (B) Decrease and decrease

   (C) Decrease and increase

   (D) Increase and increase

2. In the plate loading test for determining the bearing capacity of soil, the size of the square plate should be

   (A) Greater than 1000 mm

   (B) Less than 400 mm

   (C) Between 750 mm and 1000 mm

   (D) Between 300 mm and 750 mm

3. The total (both internal and external) degree of static indeterminacy of the 2D frame shown in the following figure is

   (A) 32

   (B) 48

   (C) 24

   (D) 25

4. The maximum dry density up to which any soil can be compacted depends upon

   (A) Moisture content and amount of compaction both

   (B) Amount of compaction only

   (C) Moisture content only

   (D) None of the above

5. The purpose of reinforcement in pre-stressed concrete is

   (A) To resistance tensile stresses

   (B) To impart initial compressive stress in concrete

   (C) To develop sufficient bond stress

   (D) None of the above

6. The beam column flexible connections are expected to resist and transfer

   (A) Only shear

   (B) Torsion and moment

   (C) Only moment

   (D) Both moment and shear
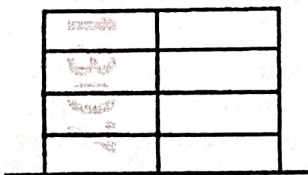
7. The kinematic indeterminacies of a single bay portal frame fixed at the base is

(A) Three

(B) Six

(C) Zero

(D) Two

8. Phreatic line in an earthen dam is

(A) Elliptical

(B) Straight line

(C) Circular

(D) Parabolic

9. Minimum centre to centre spacing of friction piles of diameter (D) as per the BIS Code is

(A) 2D

(B) 5D

(C) 4D

(D) 3D

10. If over a part of loaded beam the slope remains constant, then in that part

(A) Bending moment varies linearly

(B) Shear force varies linearly

(C) Bending moment is zero

(D) Bending moment is constant

11. The coefficient of active earth pressure for a loose sand having an angle of internal friction is 30 degree, is

(A) 3

(B) 1/3

(C) 2

(D) 1

12. A soil has a discharge velocity of 7×10^{-7} m/sec and void ratio of 0.45. Its seepage velocity is

(A) 19.1×10^{-7} m/sec

(B) 22.55×10^{-7} m/sec

(C) 6.11×10^{-7} m/sec

(D) 15.1×10^{-7} m/sec

13. Number of wind zones in India are

    (A) 4

    (B) 7

    (C) 6

    (D) 5

14. The design horizontal seismic coefficient is given by

    (A) ZISa/Rg

    (B) ZISa/2Rg

    (C) 3ZISa/Rg

    (D) 2ZISa/Rg

15. A three hinged arch supported at different levels is statically

    (A) Indeterminate structure

    (B) Determinate structure

    (C) Both (A) and (B)

    (D) None of the above

16. If A and B are non-zero square matrices, then AB = 0 implies

    (A) A is singular

    (B) A and B are orthogonal

    (C) A and B are singular

    (D) B is singular

17. Effective stress on soil

    (A) Decreases both void ratios and permeability

    (B) Decreases void ratio and increases permeability

    (C) Increases void ratio and decreases permeability

    (D) Increases both void ratios and permeability

18. Maxwell's reciprocal theorem is valid

    (A) For all structures with linear force displacement relation

    (B) For linear and non-linear force displacement relation

    (C) For (A) and (B)

    (D) None of the above

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

(A) Shape and height of the building

(B) Shape of the building

(C) Location of the building

(D) Location, shape and height of the building

20. Beams with compact section attain plastic moment capacity due to

(A) Possibility of sufficient plastic hinge rotation

(B) Plastic redistribution of stress

(C) Web crippling restraint

(D) Local buckling restraint

21. IS : 1893 (Part 1) is used for

(A) Wind load calculation

(B) Earthquake load calculation on building

(C) Ductile detailing

(D) Live load calculation

22. The central ordinate of the influence line for bending moment at quarter point of a simply supported beam of 8 m span is

(A) 3/2 units

(B) 5 units

(C) 4.5 units

(D) 4 units

23. Uniformity coefficient of a soil is

(A) Always greater than 1

(B) Equal to or less than 1

(C) Equal to or greater than 1

(D) Always less than 1

24. If the storey height is equal to the length of RCC wall, the percentage increase in strength is

(A) 10%

(B) 40%

(C) 30%

(D) 20%

25. The degree of freedom of a block type machine foundation is

(A) 6

(B) 2

(C) 3

(D) 4

26. Pre-stressing losses in post-tensioned and pre-tensioned beams are respectively

(A) 10% and 10%

(B) 25% and 20%

(C) 20% and 20%

(D) 15% and 20%

27. A cantilever beam of span 10 m is subjected to a downward load of 80 kN/m uniformly distributed over its entire length and a concentrated upward load P at its free end, the value of load of P is

(A) 100 kN

(B) 400 kN

(C) 300 kN

(D) 200 kN

28. The point of contraflexure is a point where

(A) Bending moment is maximum

(B) Bending moment changes sign

(C) Shear force changes sign

(D) Shear force is maximum

29. Intermediate vertical stiffeners are provided in plate girders

(A) To transfer concentrated loads

(B) To prevent local buckling

(C) To prevent excessive deflection

(D) To eliminate the web crippling

30. Approximate value of shrinkage strain in the concrete is

(A) 0.03

(B) 0.00003

(C) 0.0003

(D) 0.003

31. A fixed beam of span L is carrying a point load P at its mid span. If the moment of inertia of the mid half length is two times that of the remaining length, the fixed end moments will be

(A) PL/32

(B) 5 PL/32

(C) 9 PL/32

(D) 5 PL/48

32. Compressibility of sandy soil is

(A) Much greater than that of clayey soils

(B) Much less than that of clayey soils

(C) Almost equal to that of clayey soils

(D) None of the above

33. The thickness of the base plate is determined from

(A) Punching criteria

(B) Flexural strength of the plate

(C) Bearing strength of the concrete pedestal

(D) Shear strength of the plate

34. Deflection of a sheet pile in a braced cut

(A) Decreases from top to bottom

(B) Decreases from top and then increases

(C) Increases from top and then decreases

(D) Increases from top to bottom

35. Ratio of bearing capacity of double under reamed (UR) pile to that of single under reamed (UR) pile is nearly

(A) 1.7

(B) 1.5

(C) 2

(D) 2.5

36. At the location of plastic hinge

(A) The radius of curvature is minimum

(B) Flexural stress is infinite

(C) Moment is infinite

(D) Curvature is infinite

37. If a cohesive soil specimen is subjected to a vertical compressive load, the inclination of the cracks to the horizontal is

(A) 90°

(B) 0°

(C) 30°

(D) 45°

38. Cube strength of controlled concrete to be used for pre-tensioned and post-tensioned work respectively should not be less than

(A) 42 MPa and 35 MPa

(B) 53 MPa and 42 MPa

(C) 42 MPa and 42 MPa

(D) 42 MPa and 53 MPa

39. IS : 875 (Part 3) is used for

(A) Earthquake loading

(B) Wind loading

(C) Live loading

(D) Dead loading

40. The number of independent equations to be satisfied for static equilibrium of a plane structures is

(A) 2

(B) 6

(C) 4

(D) 3

41. For a T-beam, shape factor is 1.14. The factor of safety in bending is 1.50, if the allowable stress is increased by 22 percentage for wind and seismic loads, then the load factor is

(A) 1.40

(B) 1.10

(C) 1.35

(D) 1.20

42. Number of seismic zones in India are

(A) 6

(B) 3

(C) 4

(D) 5

43. Limits are placed on slenderness ratio of tension members

(A) To check the lateral vibration of the member

(B) To check the kinking of the member

(C) To check the buckling of the member

(D) To check the crippling of the member

44. Negative skin friction on a pile

(A) Acts upward and reduces the load carrying capacity of the pile

(B) Acts downward and reduces the load carrying capacity of the pile

(C) Acts downward and increases the load carrying capacity of the pile

(D) Acts upward and increases the load carrying capacity of the pile

45. Which of the following is the load factor ?

(A) Failure load/Working load

(B) Yield load/Working load

(C) Dynamic load/Static load

(D) Failure load/Yield load

46. Water content of soil can

(A) Greater than 100%

(B) Less than 0%

(C) Can take any values from 0% to 100%

(D) Never greater than 100%

47. Maximum percentage reinforcement in case of slabs is limited to

(A) 6%

(B) 1%

(C) 2%

(D) 4%

48. The maximum deflection of a fixed beam of span L, carrying a central load W is equal to

(A) $WL^3/48\ EI$

(B) $7WL^3/384\ EI$

(C) $WL^3/192\ EI$

(D) $WL^3/96\ EI$

49. If the Euler load for a steel column is 1500 kN and crushing load is 2000 kN, the Rankine load is equal to

(A) 2500 kN

(B) 857.14 kN

(C) 1250 kN

(D) 1800.51 kN

50. If the permissible stress in tension is 145 MPa, then the depth of neutral axis for singly rectangular balanced section will be

(A) $0.392 \times d$

(B) $0.359 \times d$

(C) $0.412 \times d$

(D) $0.309 \times d$