CIVIL ENGINEERING

PART – 1

Each question carries one mark. **(50 × 1 = 50)**

1. Plaster of Paris is obtained by calcining
   (A) Bauxite (B) Gypsum
   (C) Kankor (D) Limestone

2. Basalt is
   (A) Sedimentary Rock (B) Metamorphic Rock
   (C) Extrusive Igneous Rock (D) Intrusive Igneous Rock

3. The effective Length of column fixed at one end and hinged at the other is
   (A) L (B) 1.5L
   (C) 0.85L (D) 0.7L

4. Torsional rigidity is the product of
   (A) Modulus of Elasticity and Moment of Inertia
   (B) Rigidity Modulus and Moment of Inertia
   (C) Rigidity Modulus and Polar Moment of Inertia
   (D) None of these

5. The number of independent elastic constants for a linear elastic isotropic and homogeneous material is
   (A) 4 (B) 3
   (C) 2 (D) 6

6. A rectangular beam loaded transversely, the maximum compressive stress develops at
   (A) Bottom fibre (B) Neutral axis
   (C) Top fibre (D) None of these

Space For Rough Work

7. Test most suitable for measuring workability of concrete of very low workability is

(A) Slump test
(B) Compaction factor test
(C) Vee – Bee test
(D) None

8. The supportive foundation structure for many columns provided over a slab is called as

(A) Strip footing
(B) Grillage footing
(C) Raft footing
(D) Combined footing

9. King post is provided in which form of roofing system ?

(A) Flat roof
(B) Lean to roof
(C) Sloped roof
(D) Gable roof

10. Separation of ingredients from concrete during transportation is called

(A) Segregation
(B) Creep
(C) Shrinkage
(D) Bleeding

11. In the Brick Masonry the ideal combination for a strong brick is

(A) Weak mortar
(B) Strong mortar
(C) Medium mortar
(D) None of these

12. Direct ranging is possible only when the end stations are

(A) Close to each other
(B) Not more than 100m
(C) Mutually intervisible
(D) Located at highest point in the sea

13. The curve composed of two arcs of different radii having their centres on opposite side of the curve is known as

(A) Simple curve
(B) Compound curve
(C) Reverse curve
(D) Transition curve

Space For Rough Work

14. A clinometer is used for
(A) Setting out right angles
(B) Defining natural features
(C) Measuring angle of slope
(D) Correcting the line of collimation

15. A negative declination shows that the magnetic meridian is to the
(A) Eastern side of the true meridian
(B) Northern side of the true meridian
(C) Southern side of the true meridian
(D) Western side of the true meridian

16. The fundamental principles of surveying is to work from
(A) Lower to higher (B) Higher to lower
(C) Part to whole (D) Whole to part

17. The centre of gravity of volume of liquid displaced is
(A) Centre of pressure
(B) Centre of Buoyancy
(C) Metacentre
(D) Centre of gravity

18. An ideal fluid is
(A) One which obeys Newton's Law
(B) One which satisfies continuity equation
(C) Flows through pipes with least friction
(D) Frictionless & incompressible

19. The pressure at a point 4mt below the free water surface is
(A) 19.24 kPa (B) 29.24 kPa
(C) 39.24 kPa (D) 49.24 kPa

Space For Rough Work

20. The position of centre of pressure on a plane surface immersed vertically in a static mass of fluid is

(A) Above the centroid
(B) Below the centroid
(C) At the centroid
(D) None of the above

21. The speed of a pressure wave through a pipe depends upon

(A) Length of the pipe
(B) Viscosity of fluid
(C) Bulk modulus
(D) Pressure in the pipe

22. The maximum deflection of a fixed beam of length 'I' carries a total load 'W' uniformly distributed over the whole span, is

(A) WI^3 / 96EI
(B) WI^3 / 196EI
(C) WI^3 / 192EI
(D) WI^3 / 384EI

23. A three hinged arch is

(A) Bent beam
(B) Determinate structure
(C) Indeterminate structure
(D) None of these

24. A simply supported beam carrying UDL throughout can be analysed using the following equations :

(A) $\sum H = 0$ & $\sum V = 0$
(B) $\sum H = 0$ & $\sum M = 0$
(C) $\sum V = 0$ & $\sum M = 0$
(D) None of these

25. What is the difference between Oscillation and Vibration ?

(A) Both are same
(B) Oscillation represents rigid body, Vibration represents deformable body
(C) Oscillation represents deformable body, Vibration represents rigid body
(D) None of the above

Space For Rough Work

26. According to IS:456:2000, the minimum eccentricity for compression members in no case
(A) Shall not exceed 20mm
(B) Shall not be greater than 30mm
(C) Shall be between 20 – 30mm
(D) None of these

27. Which of the following types of rivetted joints is free from bending stress ?
(A) Lap joint
(B) Butt joint with single cover plate
(C) Butt joint with double cover plate
(D) Zig zag joint

28. Poisson's ratio for concrete ranges between
(A) 0.10 – 0.15 (B) 0.15 – 0.25
(C) 0.25 – 0.3 (D) 0.3 – 0.35

29. For long span beam design which design criteria dominates ?
(A) Design for B.M (B) Design for shear
(C) Design for torsion (D) Design for deflection

30. Beams and slabs constructed together is called as
(A) Monolithic construction
(B) Slip from construction
(C) Precast construction
(D) Rapid wall construction

31. As per IS:456:2000, the maximum cement content for RCC members is
(A) 200 kg/m^3 (B) 300 kg/m^3
(C) 450 kg/m^3 (D) 550 kg/m^3

Space For Rough Work

32. Modulus of elasticity of concrete is

(A) $6000\sqrt{f_{ck}}$ (B) $5000\sqrt{f_{ck}}$

(C) $5700\sqrt{f_{ck}}$ (D) $6700\sqrt{f_{ck}}$

33. In the term M25 Concrete, M means

(A) Moderate (B) Modular ratio

(C) Modulus of elasticity (D) Mix

34. Plastic limit of soil is determined by

(A) Casagrande test (B) Plastic test

(C) Liquid test (D) Thread test

35. Which of these corrections are required while using standard penetration test values ?

(A) Over burden pressure (B) Dilatancy

(C) Ground water (D) All the above

36. At optimum moisture content, the density of soil is

(A) Maximum (B) Minimum

(C) Equal to bulk density (D) None of the above

37. Which of the following methods of analysis of water distribution system is most suitable for long and narrow pipe system ?

(A) Circle method

(B) Equivalent pipe method

(C) Hardy cross method

(D) Electrical analysis method

38. Pick out the factor that is essential in estimating the quality of water required for drinking water supply scheme.

(A) Quality of rainfall (B) Catchment area

(C) Rate of demand (D) Area of city

Space For Rough Work

39. Economical diameter of a pipe, through which a discharge of 0.3 cumecs is to be passed, is

(A) 1.2 m (B) 0.8 m

(C) 0.6 m (D) 0.4 m

40. Dissolved oxygen in stream is

(A) Maximum at noon (B) Minimum at noon

(C) Maximum at midnight (D) Same throughout the day

41. Maximum value of angularity number for coarse aggregate :

(A) 21 (B) 31

(C) 11 (D) 41

42. The amount of super elevation on railways is

(A) $\frac{gv^2}{GR}$ (B) $\frac{Gv^2}{gR}$

(C) $\frac{GR}{gv^2}$ (D) $\frac{gR}{Gv^2}$

43. For the movement of vehicles at an intersection of two roads without any interference, the type of grade separator generally preferred is

(A) Delta (B) Diamond interchange

(C) Trumpet (D) Full clover leaf

44. According to HCM of U.S.A, practical lane width is

(A) 2.7 m (B) 3.3 m

(C) 3.0 m (D) 3.6 m

45. In India the ratio between the weight of the rail to the locomotive axle load is

(A) 310 (B) 410

(C) 510 (D) 610

Space For Rough Work

46. Most widely used type of a deep state tube well in India is

(A) Cavity tube well

(B) Strainer tube well

(C) Slotted pipe – gravel packed tube well

(D) None of these

47. Types of pumps used in the wells are

(A) Submersible pumps (B) Jet pumps

(C) Turbine pumps (D) All of these

48. A linear reservoir is one in which storage varies linearly with

(A) Time (B) Outflow rate

(C) Inflow rate (D) Elevation

49. Economical height of a dam is that height, for which

(A) Cost per unit storage is minimum

(B) Benefit cost ratio is maximum

(C) Net benefits are maximum

(D) None of these

50. Which source of water among the following is not a surface source ?

(A) River (B) Wells

(C) Lakes (D) Ocean

Space For Rough Work

PART –2

Each question carries two marks. **(25 × 2 = 50)**

51. The second moment of area of a rectangle having dimensions 'a' & 'b' with respect to its diagonal is

(A) $\frac{1}{6}\{a^2b^2/(a+b)\}$ (B) $\frac{1}{6}\{a^3b^3/(a^2+b^2)\}$

(C) $\frac{1}{12}\{a^2b^2/(a+b)\}$ (D) $\frac{1}{12}\{a^3b^3/(a^2+b^2)\}$

52. A cantilever beam is subjected to concentrated load of 2kN at the free end. The beam also carries a UDL of 5 kN/M over the entire length of 4m. The moment at the support is

(A) 16 kN – M (B) 36 kN – M

(C) 24 kN – M (D) 48 kN – M

53. If $\sigma_x = 0$, $\sigma_y = 0$, and $\tau_{xy} = 100$ MPa, the maximum shear stress in the element is

(A) 100 MPa (B) 200 MPa

(C) 150 MPa (D) Zero

54. If the length of the transition curve to be introduced between a straight and a circular curve of radius 500 m is 90 m, the maximum deflection angle to locate its function point is

(A) 1° 43' 0'' (B) 1° 43' 18''

(C) 1° 43' 28'' (D) 1° 43' 38''

55. For a curve of radius 100 m and normal chord 10 m the Rankine's deflection angle is

(A) 1° 25.95' (B) 1° 35.95'

(C) 0° 25.95' (D) 1° 45.95'

Space For Rough Work

56. The head loss in a pipe of diameter 'd' carrying oil at a flow rate of 'Q' over a distance 'l' is 'h'. The pipe is replaced by another pipe of diameter 'd/2'. The head loss taking all other things same, is

(A) 0.5 h (B) 4 h

(C) 8 h (D) 32 h

57. A trapezoidal channel with bottom width of 3 m and side slope of 1V:1.5H carries a discharge of 8 m^3/sec with a flow depth of 1.5m. Froude's number of the flow is

(A) 0.066 (B) 0.132

(C) 0.265 (D) 0.317

58. Velocity in a pipe of diameter 20mm is 2m/sec. For the same discharge, calculate the velocity if the diameter is changed to 12 mm.

(A) 4 m/sec (B) 2 m/sec

(C) 5.5 m/sec (D) 5.6 m/sec

59. A cantilever beam is fixed at 'A' and free at 'B'. It is loaded at free end by a point load 'P'. The first half portion from fixed end is rigid while other half has flexural rigidity EI. Identify the correct combination of deflection at free end 'B' and bending moment at fixed end 'A' respectively.

(A) $PL^3/3EI$ and 2PL (B) $PL^3/3EI$ and PL

(C) $PL^3/24EI$ and PL (D) $PL^3/24EI$ and 2PL

60. In the water supply project, the diameter of the main pipe used is 1200 mm and thickness is 12 mm which is subjected to a fluid pressure of 0.8 MPa. Then Hoop stress in the cylinder is

(A) 30 MPa (B) 20 MPa

(C) 40 MPa (D) 50 MPa

Space For Rough Work

61. Deflection after construction of RCC slab should not exceed

(A) $\frac{L}{250}$ (B) $\frac{L}{150}$

(C) $\frac{L}{350}$ (D) $\frac{L}{450}$

62. A simply supported beam having span 'L' carries a UDL 'w' throughout the span. The maximum deflection is

(A) $\frac{5}{48}$ (wL^4/EI) (B) $\frac{5}{384}$ (wL^3/EI)

(C) $\frac{5}{48}$ $(M_{max}L^2/EI)$ (D) $\frac{5}{48}$ $(M_{max}L/EI)$

63. Flexural tensile strength of concrete as per IS 456:2000 is

(A) $f_{cr} = 1.7\sqrt{f_{ck}}$ (B) $f_{cr} = 0.7\sqrt{f_{ck}}$

(C) $f_{cr} = 2.7\sqrt{f_{ck}}$ (D) $f_{cr} = 3.7\sqrt{f_{ck}}$

64. A simply supported beam AB of length 'L' carries a concentrated load 'P' at an intermediate point 'C'. If slope at 'A' is 0.75 times the slope at 'B', then the length of portion AC is equal to

(A) $\frac{3}{4}L$ (B) $\frac{4}{7}L$

(C) $\frac{5}{7}L$ (D) $\frac{2}{7}L$

65. In a Cantilever beam AB loaded by a load 'w' at B, the first half portion has flexural rigidity EI and second half portion has infinite flexural rigidity. The deflection and slope at mid point respectively is

(A) $\frac{5}{48}$ (wL^3/EI) & $3wL^2/8EI$ (B) $\frac{1}{24}$ (wL^3/EI) & $3wL^2/8EI$

(C) $\frac{1}{24}$ (wL^3/EI) & $wL^2/8EI$ (D) $(wL^3/8EI)$ & $3wL^2/8EI$

Space For Rough Work

66. A three hinged parabolic arch having a span of 25 m and rise of 5 m carries a point load of 10 kN at quarter span from the left end. The resultant reaction at the left support and its inclination with the horizontal are respectively

(A) 9.01 kN and 33.69° (B) 9.01 kN and 56.31°

(C) 7.01 kN and 56.69° (D) 7.01 kN and 33.69°

67. A retaining wall retains a sand strata with $\Phi = 30°$ upto its top. If a uniform surcharge 12000 N/M^2 is subsequently put on the sound strata, then the increase in the lateral earth pressure intensity on a wall will be

(A) 1000 N/m^2 (B) 2000 N/m^2

(C) 4000 N/m^2 (D) 8000 N/m^2

68. A soil sample has liquid limit = 45%, plastic limit = 25%, shrinkage limit = 17 %, natural moisture content = 30%. The consistency index of the soil is

(A) 15/20 (B) 13/20

(C) 8/20 (D) 5/20

69. A soil sample having a cohesion C = 106 kN/m^2 and $\Phi = 6°$ is tested in an unconfined compression test apparatus. The angle which the failure plane of the sample will make with the axis of the sample is

(A) 42° (B) 45°

(C) 48° (D) 51°

70. If average daily consumption of a city is 1,00,000 m^3, then maximum daily consumption of peak hourly demand will be

(A) 1,00,000 m^3 (B) 1,50,000 m^3

(C) 1,80,000 m^3 (D) 2,70,000 m^3

Space For Rough Work

71. The population of a town in three consecutive years are 5000, 7000 and 8400 respectively. The population of the town in the fourth consecutive year according to the geometrical increase method is

(A) 9500 (B) 9800

(C) 10100 (D) 10920

72. What volume is represented by 57 mm of runoff depth from a basin of area 3300 km^2 in cumec days ?

(A) 2177.08 (B) 2275.09

(C) 2378.5 (D) 2425.5

73. As per IRC recommendations the rate of change of radial acceleration (C) in m/s^3 for highways varies according to the relation

(A) C = (65 + v)/75 (B) C = 75/(65 + v)

(C) C = (85 + v)/95 (D) C = 95/(85 + v)

74. If a stream carrying a discharge of 4 cumecs per metre width, is having a silt factor of 2.0, then Lacey's scour depth will be

(A) 3.4 m (B) 5.4 m

(C) 2.7 m (D) 1.35 m

75. The standard equation of a cubic parabolic transition curve provided on roads is

(A) $X^3/12RL$ (B) $X^3/16RL$

(C) $X^3/6RL$ (D) None of these

Space For Rough Work