01. The main constituent of cement which is responsible for initial setting of cement is

a. Dicalcium silicate
b. Tricalcium silicate
c. Tricalcium aluminate
d. All of the above

02. Consider the following statements: A transition curve is provided on a circular curve on a highway to provide

1. Gradual introduction of centrifugal force
2. Minimum stopping sight distance
3. Gradual introduction of super elevation
4. Comfort and security to passengers

Which of the statements given above are correct?
(a) 1, 2 and 3 (b) 1, 3 and 4
(c) 2, 3 and 4 (d) 1, 2 and 4

03. The graduations in prismatic compass

i) are inverted
ii) are upright
iii) run clockwise having 0 at south
iv) run clockwise having 0 at north the correct answer is

a. (i) and (iii)
b. (i) and (iv)
c. (ii) and (iii)
d. (ii) and (iv)

04. Consider the following statements in relation to the given sketch:

1. Soil is partially saturated at degree of saturation = 60%
2. Void ratio = 40%
3. Water content = 30%
4. Saturated unit weight = 1.5 g/cc

Which of these statements is /are correct?
(a) 1, 2 and 3
(b) 1, 3 and 4
(c) 2, 3 and 4
(d) 1, 2 and 4

05. Disinfection of water results in

a. Removal of turbidity
b. Removal of hardness
c. Killing of distance bacteria
d. Complete sterilisation

06. Match List-I (Type of water source) with List-II (Treatment to be given) and select the correct answer using the codes given below lists:

List – I	List – I
A. Surface water (river or canal)	1. Aeration, coagulation sedimentation and disinfection
B. Water from infiltration gallery	2. Disinfection
C. Lake/pond water	3. $CuS0_4$ treatment, coagulation, sediment-ation, filtration and disinfection
D. Tube well water	4. Coagulation, flocculation, sedimentation, filtration and disinfection

Codes
a. A – 4, B – 1, C – 3, D – 2
b. A – 1, B – 4, C – 3, D – 2
c. A – 1, B – 4, C – 2, D – 3
d. A – 4, B – 1, C – 2, D – 3

07. The clay mineral with the largest swelling and shrinkage characteristics is

a. Kaolinite
b. Illite
c. Montmorillonite
d. None of the above

08. Consider the following operations in a spire test:

1. Depress telescope and sight a point on the ground nearer to the instrument.
2. Clamp horizontal plates.
3. Sight a well-defined high point on a high building.
4. Change face and repeat the procedure.

The correct sequence of these operations is
(a) 1, 2, 3, 4
(b) 3, 1, 2, 4
(c) 3, 2, 1, 4
(d) 2, 1, 3, 4

09. As for testing compressive strength of cement, the size of cube used is

a. 50 mm
b. 70.6 mm
c. 100 mm
d. 150 mm

10. The direction of the magnetic meridian is established at each traverse station and the direction of the line is determined with reference to the magnetic meridian. This method of traversing is called.

(a) Fast needle method
(b) Loose needle method
(c) Bearing method
(d) Fixed needle method

11. The following bearing were observed while traversing with a compass:

Line	F.B	B.B
AB	104^0 30'	284^0 30'
BC	48^0 15'	226^0 0'
CD	290^0 30'	115^0 15'
DA	180^0 15'	357^0 15'

Which stations were affected by local attraction ?

a. A and B
b. B and C
c. C and D
d. A and D

12. A spliting tensile test is performed on a cylinder of diameter 'D' and length 'L'. If the ultimate load is 'P', then the splitting tensile strength of concrete is given by

A. $\frac{P}{\pi DL}$ B. $\frac{2P}{\pi DL}$

C. $\frac{4Pl}{\pi D}$ D. $\frac{2Pl}{\pi D}$

13. Early attainment of strength in rapid hardening cement is mainly due to

a. Gypsum
b. Finer grinding
c. Tricalcium silicate
d. Tricalcium aluminate

14. A summit curve is formed at the intersection. of a 3% upgrade and a 5% downgrade. What is the length of the summit curve in order to provide a stopping distance of 128 m?

(a) 271 m (b) 298 m
(c) 322 m (d) 340 m

15. The temporary adjustment of a prismatic compass are

i) Centering
ii) Leveling
iii) Focusing the prism
the correct order is

a. (i), (iii), (ii)
b. (i), (ii), (iii)
c. (ii), (iii), (i)
d. (iii), (i), (ii)

16. Match List-I (Soil classification of an aquifer) with List-II (Values of the range of hydraulic conductivities in meter per day)

List – I	List – II
A. Fine gravel	1. 1 to 10
B. Very fine sand	2. 0.1 to 0.01
C. Silt	3. 100 to 1000
D. Pure clay	4. 10^{-5} to 10^{-6}

Codes :
a. A – 1, B – 3, C – 4, D – 2
b. A – 1, B – 3, C – 2, D – 4
c. A – 3, B – 1, C – 4, D – 2
d. A – 3, B – 1, C – 2, D – 4

17. Chlorine demand of water is equal to
a. Applied chlorine
b. Residual chlorine
c. Sum of applied and residual chlorine
d. Difference of applied and residual chlorine

18. Match List-I (Name of impurity in water) with List-II (Removed by) and select the correct answer using the codes given below the lists:

List – I	List – I
A. Fluorides	1. Activated carbon
B. Manganese	2. Activated alumina
C. Taste and odour	3. Manganese zeolite

Codes
a. A – 1, B – 2, C – 3
b. A – 2, B – 3, C – 1
c. A – 2, B – 1, C – 3
d. A – 3, B – 2, C – 1

19. Dispersed type of soil structure in and arrangement comprising particles having
a. Face to face or parallel orientation
b. Edge to edge orientation
c. Edge to face orientation
d. All of the above

20. For proper slow mixing in the flocculator of a water treatment plant, the temporal mean velocity gradient G needs to be of the order of
(a) 5 to $20S^{-1}$
(b) 20 to $80s^{-1}$
(c) 100 to $200S^{-1}$
(d) 250 to $350s^{-1}$

21. For testing compressive and tensile strength of cement, the cement mortar is made by mixing cement and standard sand in the proportions of
a. 1 : 2
b. 1 : 3
c. 1 : 4
d. 1 : 6

22. The true bearing of a line is 34^0 20' 40" and the magnetic declination at the place of observation is 2^0 0' 20" W on the date of observation. The magnetic bearing of the line is
(a) 36^0 21' 00"
(b) 34^0 20' 20"
(c) 32^0 20' 20"
(d) 32^0 00' 20"

23. The process in which the chlorination is done beyond the break point is known as
a. Prechlorination
b. Post chlorination
c. Super chlorination
d. Break point chlorination

24. Match List I (Admixtures) with List II (Chemicals) and select the correct answer using the codes given below the lists

List – I	List – II
1. Water-reducing admixture	1. Sulphonated melanin formaldehyde
2. Air-entraining agent	2. Calcium chloride
3. Superplasticiser	3. Lignosulphonate
4. Accelerator	4. Neutralised vinsol resin

Codes :
a. A – 2, B – 4, C – 1, D – 3
b. A – 1, B – 3, C – 4, D – 2
c. A – 3, B – 4, C – 1, D – 2
d. A – 3, B – 4, C – 2, D – 1

25. The slump recommended for mass concrete is about
a. 25 mm to 50 mm
b. 50 mm to 100 mm
c. 100 mm to 125 mm
d. 125 mm to 150 mm

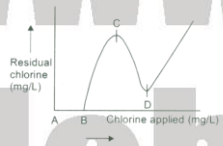
26. Which of the following are requirements for the design of a transition curve for a highway system?
1. Rate of change of grade
2. Rate of change of radial acceleration
3. Rate of change of super elevation
4. Rate of change of curvature
Select the correct answer using the code given below:
(a) 1, 2 and 3
(b) 2, 1 and 4
(c) 1, 3 and 4
(d) 2, 3 and 4

27. The process of turning the telescope about the vertical axis in horizontal plane is knows as
a. Transiting
b. Reversing
c. Plunging
d. swinging

28. Consider the following statements:
A well-graded sand should have
1. Uniformity coefficient greater than 6
2. Coefficient of curvature between 1 and 3
3. Effective size greater than 1 mm.
Of these statements
(a) 1, 2 and 3 are correct
(b) 1 and 2 are correct
(c) 2 and 3 are correct
(d) 1 and 3 are correct

29. Disinfection efficiency is
a. Reduced at higher pH value of water
b. Unaffected by pH value of water
c. Increased at higher pH value of water
d. Highest at pH value equal to 7

30.



If only ammonia was present in water, the only change in the above diagram would have been that the curve would

(a) Be a straight line
(b) Become parallel to Y-axis
(c) Become parallel to X-axis after 'D'
(d) Be passing through the origin

31. If the water table rises upto ground surface then the

a. Effective stress is reduced due to decrease in total stress only but pore water pressure does not change
b. Effective stress is reduced due to increase in pore water pressure only but total stress does not change
c. Total stress is reduced due to increase in pore water pressure only but effective stress does not change
d. Total stress is increased due to decrease in pore water pressure but effective stress does not change

32. Which one of the following pairs is not correctly matched?

(a) Declination :Horizontal angle between magnetic meridian and true meridian
(b) Bowditch's rule : Employed to adjust closing error of a closed traverse
(c) Deflection angle : Measured in case of open traverse instead of measuring included angle
(d) Reconnaissance survey : Employed for detailed and precise survey

33. The basic purpose of a retarder in concrete is

a. To increase the initial setting time of cement paste in concrete
b. To decrease the initial setting time of cement paste in concrete
c. To reader the concrete more water tight
d. To improve the workability of concrete mix

34. Batching refers to

(a) Controlling the total quantity at each batch
(b) Weighing accurately, the quantity of each material for a job before mixing
(c) Controlling the quantity of each material into each batch
(d) Adjusting water to be added in each batch according to the moisture content of the materials being mixed in the batch

35. A telescope is said to be inverted if its.

a. Vertical circle is to its right and the bubble of the telescope is down
b. Vertical circle is to its right and the bubble of the telescope is up
c. Vertical circle is to its left and the bubble of the telescope is down
d. Vertical circle is to its left and the bubble of the telescope is up

36. Full amount of super-elevation on a horizontal curve is provided at the

(A) Beginning Of The Transition. Curve
(B) Centre Of The Circular Curve
(C) End Of The Transition Curve
(D) Centre Of The Transition Curve

37. In lime-soda process

a. Only carbonate hardness is removed
b. Only non-carbonate hardness is removed
c. Lime reduces the carbonate hardness and soda-ash removes the non-carbonate hardness
d. Lime reduces the non-carbonate hardness and soda-ash removes the carbonate hardness

38. A soil has mass unit weight' y " water content 'w' (as ratio), the specific gravity of soil solids = G, unit weight of water = y w ; 'S' the degree of saturation of the soil is given by

A. $S = \frac{1+W}{\frac{\gamma W}{\gamma}(1+W)-\frac{1}{G}}$ B. $S = \frac{W}{\frac{\gamma W}{\gamma}(1+W)-\frac{1}{G}}$

C. $S = \frac{(1+W)}{\frac{\gamma W}{\gamma}(1+W)-\frac{1}{WG}}$ D. $S = \frac{W}{\frac{\gamma W}{\gamma}(1+W)-\frac{1}{WG}}$

39. The critical hydraulic gradient I_c of a soil mass of specific gravity G and voids ratio e is given by

a. $i_c = \frac{G+1}{1-e}$
b. $i_c = \frac{G-1}{1+e}$
c. $i_c = \frac{G+1}{1+e}$
d. $i_c = \frac{G-1}{1-e}$

40. Match List-I (Water treatment units) with List-II (Detention time) and select the correct answer

List – I		List – I	
A.	Rapid mixing unit	1.	11 hours
B.	Flocculator	2.	10 seconds
C.	Prpeller mixing unit	3.	30 seconds
D.	Sedimentation tank	4.	30 minutes

Codes :
a. A – 3, B – 4, C – 2, D – 1
b. A – 4, B – 3, C – 1, D – 2
c. A – 4, B – 3, C – 2, D – 1
d. A – 3, B – 4, C – 1, D – 2

41. Compared to mild steel, cast iron has

i) High compressive strength
ii) High tensile strength
iii) Low compressive strength
iv) Low tensile strength

The correct answer is
The correct answer is
a. (i) and (ii)
b. (ii) and (iii)
c. (iii) and (iv)
d. (i0 and (iv)

42. A plane, which is perpendicular to the plumb line through a point and is tangential to the level surface at that point is called a
(a) Tangential plane
(b) Vertical plane
(c) Level plane
(d) Horizontal plane

43. The hydraulic head that would produce a quick condition in a sand stratum of thickness 1.5 m, specific gravity 2.67 and voids ratio 0.67 is equal to
a. 1.0 m
b. 1.5 m
c. 2.0 m
d. 3 m

44. Consider the following strengths of concrete:
1. Cube strength
2. Cylinder strength
3. Split-tensile strength
4. Modulus of rupture
The correct sequence in increasing order of these strengths
(a) 3, 4, 2, 1
(b) 3, 4, 1, 2
(c) 4, 3, 2, 1
(d) 4, 3, 1, 2

45. Paints with white lead base are suitable for painting of
a. Wood work
b. Iron work
c. Both wood work and iron work
d. None of the above

46. An ideal horizontal transition curve is a
(a) Parabola
(b) Circle
(c) Clothoid spiral
(d) Hyperbola

47. The amount of water used for one kg of distemper is
a. 0 . 2 litre
b. 0 . 4 litre
c. 0 . 6 litre
d. 0 . 8 litre

48. If a soil sample of weight 0.18 kg having a volume of 10-4$_m$3 and dry unit wt. of 1600 kg! m^3 is mixed with 0.02 kg of water then the water content in the sample will be

List – I	List – II
A. Void Ratio	1. V_V /V
B. Porosity	2. W_W /W_s
C. Degree of saturation	3. V_W /V_v
D. Water content	4. W/V
	5. V_V / V_s

Codes :
a. A – 4, B – 2, C – 5, D – 1
b. A – 5, B – 4, C – 3, D – 1
c. A – 4, B – 2, C – 5, D – 2
d. A – 5, B – 1, C – 3, D – 2

49. In brick masonry the bond produced by laying alternate headers and stretchers in each course is known as
a. English bond
b. Double flemish bond
c. Zigzag bond
d. Single flemish bond

50. The correct sequence of workability test(s) / method (s) in the order of their application from low to high workability is
(a) Slump test, Compacting factor test and Vee-bee consistometer.
(b) Compacting factor test, Vee-bee consistometer and Siumptest
(c) Vee-bee consistometer, Slump test and Compacting factor test.
(d) Vee-bee consistometer, Compacting factor test and Slump test

51. Match List I (Workability test) with List " (Meassurements) and select the correct answer:

List – I	List – II
1. Slump test	1. 300 mm to 500 mm
2. Compacting factor	2. 75 mm to 125 mm
3. Vee bee test	3. 0.80 to 0.98
4. Flow test	4. Zero to 10 sec

Codes :
a. A – 2, B – 4, C – 3, D – 1
b. A – 1, B – 3, C – 4, D – 2
c. A – 1, B – 4, C – 3, D – 2
d. A – 2, B – 3, C – 4, D – 1

52. Which one of the following aggregate gives maximum strength in concrete?
(a) Rounded aggregate
(b) Elongated aggregate
(c) Flaky aggregate
(d) Cubical aggregate

53. Consider the following statements: Pozzolana used as an admixture in concrete has the following advantages
1. It improves workability with lesser amount of water
2. It increases heat of hydration and so sets the concrete quickly
3. It increases resistance to attack by salts and sulphates quickly
4. It leaches calcium hydroxide
Select the correct answer using the codes given below:
(a) 1, 2, 3 and 4
(b) 1, 2 and 4
(c) 1 and 3
(d) 2, 3 and 4

54. Match List I (Admixture) with List" (Action in Concrete) and select the correct answer:

List – I	List – II
A. Calcium lignosulphonate	1. Anti bleeder
B. Aluminium powders	2. Retarder
C. Tartaric Acid	3. Air entrainer
D. Aluminium sulphate	4. Water reducer

Codes :
a. A – 3, B – 2, C – 1, D – 4
b. A – 4, B – 3, C – 2, D – 1
c. A – 3, B – 4, C – 1, D – 2
d. A – 4, B – 2, C – 3, D – 1

55. Bleeding of concrete leads to which of the following?
1. Drying up of concrete surface
2. Formation of pores inside
3. Segregation of aggregate
4. Decrease in strength
Select the correct answer using the codes given below
(a) 1 only
(b) 1 and 2
(c) 1 and 3
(d) 2 and 4