01. Consider the following statements:
1. Relative compaction' is not the same as 'relative density'.
2. Vibro floatation is not effective in the case of highly cohesive soils
3. Zero air void line' and '100% saturation line' are not identical.

Of these statements
(a) 1 and 2 are correct
(b) 1 and 3 are correct
(c) 2 and 3 are correct
(d) 3 alone correct

02. Match List I (Roller type) with List II (Soil type) and select the correct answer:

List – I	List – II
A. Pneumatic roller	1. Cohesive and granular soils
B. Smooth wheeled roller	2. Plastic soils of moderate cohesion
C. Sheep foot roller	3. Cohesionless soils
D. Vibratory roller	4. Silty soils of low plasticity

Codes :
A. A – 4, B – 2, C – 1, D – 3
B. A – 3, B – 1, C – 2, D – 4
C. A – 4, B – 1, C – 2, D – 3
D. A – 3, B – 2, C – 1, D – 4

03. In a compaction test if the compacting effort is increased, it will result in

(a) Increase in maximum dry density and OMC
(b) Increase in maximum dry density but OMC remains unchanged
(c) Increase in maximum dry density and decrease in OMC
(d) NO change in maximum dry density but decrease in OMC

04. Match List-I (Equipment) with List-II (Use) and select the correct answer using the codes given below:

List – I	List – II
A. Vibratory rollers	1. To compact soils in confined areas and at corners
B. Sheep foot rollers	2. To compact road and railway embankments of sandy soils
C. Frog hammers	3. To densify sandy soils over a large area and to a larger depth
D. Vibrofloats	4. To compact clayey soils fills

Codes :
A. A – 4, B – 2, C – 1, D – 3
B. A – 4, B – 2, C – 3, D – 1
C. A – 2, B – 4, C – 1, D – 3
D. A – 2, B – 4, C – 3, D – 1

05. The following soils are compacted at the same compactive effort in the field. Which one of the following is the correct sequence in the increasing order of their maximum dry density?

(a) Silt clay - Clay - Sand - Gravel sand clay mixture
(b) Sand - Gravel sand clay mixture - Silty clay – Clay
(c) Clay - Silty clay - Sand - Gravel sand clay mixture
(d) Sand - Gravel sand clay mixture - Clay - Silty clay

06. Consider the following:
1. Increase in shear strength and bearing capacity
2. Increase in slope stability
3. Decrease in settlement of soil
4. Decrease in permeability

Which of the above with respect to compaction of soil is/are correct?
(a) 1 only
(b) 1 and 2 only
(c) 2 and 3 only
(d) 1,2, 3 and 4

07. The field density and field moisture content of a soil can be determined by

1. Core cutter method
2. Sand replacement method
3. Proctor compaction test
4. Modified proctor compaction test

(a) 1,2 3 and 4
(b) 1 and 2 only
(c) 2 and 3 only
(d) 2 and 4 only

08. The specific gravity of a soil sample is 2.7 and its void ratio is 0.945. When it is fully saturated, the moisture content of the soil will be

(a) 25%   (b) 30%
(c) 35%   (d) 40%

09. A soil deposit has a void ratio of 1.0. If the void ratio is reduced to 0.60 by compaction, the percentage volume loss is

(a) 10%
(b) 20%
(c) 30%
(d) 40%

10. If during a permeability test on a soil sample with a falling head permeameter, equal time intervals are noted for drop of head from h, to h2 and again from h2 to h3' then which one of the following relations would hold good?

(a) $h^2_3 = h_1 h_2$
(b) $h_2^2 = h_1 h_3$
(c) $h_1^2 = h_2 h_3$
(d) $(h_1 - h_2) = (h_2 - h_3)$

11. Which one of the following statements is correct?

(a) The axis of plate level should be parallel to the vertical axis.
(b) The axis of striding level must be parallel to the horizontal axis.
(c) The axis of the altitude level must be perpendicular to the line of collimation.
(d) The line of collimation must be perpendicular to the plate level axis.

12. Which one of the following is carried out by two theodolite method?

(a) Circular curve ranging
(b) Tacheometric survey
(c) Geodetic survey
(d) Astronomical survey

13. Consider the following statements: Errors eliminated by taking both face observations are those due to

1. horizontal axis not being perpendicular to the vertical axis
2. non-parallelism of the axis of telescope level and line of collimation
3. imperfect adjustment of vertical circle vemier

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

14. In a transit theodolite, error due to eccentricity of vemiers is elimlnated by reading.

(a) both vemiers
(b) both right swing and left swing
(c) right and left faces
(d) different parts of main scale

15. Which of the following set of terms does not relate to operation of a theodolite?

(a) Transiting and inverting
(b) Face left and face right
(c) Right swing and left swing
(d) Gauging and sounding

16. In a closed traverse, the sum of south latitudes exceeds the sum of north latitudes and the sum of east departures exceeds the sum of west departures. The closing line will lie in the

(a) N-W quadrant   (b) N-E quadrant
(b) S-E quadrant   (d) S-W quadrant

17. An observer standing on the deck of a ship just sees the top of a lighthouse which is 30 m above the sea level. If the height of the observer's eye is 10 m above the sea level, then the distance of the observer from the lighthouse will be nearly.

(a) 22.5 km
(b) 24.3 km
(c) 33.3 km
(d) 59.7 km

18. Consider the following assumptions of Bowditch method:

1. Angular measurements are more precise than linear measurements.
2. Linear measurements are more precise than angular measurements.
3. Errors in linear measurements are proportional to $\sqrt{L}$
4. Correction to latitude or departure of any Side = Total error

in L (or D) X $\dfrac{\text{Length of the side}}{\text{perimeter of traverse}}$

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

19. Triangulation station selected close to the main station for avoiding intervening obstruction is called

   (a) eccentric station
   (b) Pivot station
   (c) Satellite station
   (d) Tie station

20. Consider the following steps:

1. Calculation of $\sum L$ and $\sum D$
2. Correction of latitudes and departures.
3. Calculation of bearings.
4. Calculation of interior angles.
5. Calculation of independent angles.

The correct sequence of these steps in Gale's traverse table calculations is
(a) 3, 4, 5, 2, 1
(b) 4, 3, 1, 2, 5
(c) 2, 1, 3, 4, 5
(d) 4, 3, 5, 2, 1

21. Match List-I (Parameter) with List-II (Impact) and select the correct answer using the code given below the lists:

List – I		List – II
A. Excess sulphates	1.	Greater soap consumption
B. Lack of iodide		
C. Excess hardness	2.	Laxative effect
D. Excess dissolved oxygen	3.	Goitre
	4.	Corrosion of pipes

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

22. Match List-I (Parameter) with List II (Units) and select the correct answer using the codes given below the lists:

List – I	List – II
A. Turbidity	1. TON
B. Pathogen	2. TCU
C. Odour	3. JTU
D. Colour	4. MPN

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

23. One Nephelometry Turbidity Unit (NTU) is equal to the turbidity produced by

(a) 1 mg SiO_2 dissolved in 1l of distilled water with the test being run according to absorption principle
(b) 1 mg SiO_2 dissolved in 1l of distilled water with the test being run according to scattering principle
(c) 1 mg Formazin dissolved in 1l of distilled water with the test being run according to absorption principle
(d) 1 mg Formazin dissolved in 1l of distilled water with the test being run according to scattering principle