01. As per converse labarre formula group efficiency of friction piles is given by:

a. $1-\frac{\alpha}{90}\left[\frac{(n-1)m+(m-1)n}{mm}\right]$

b. $1-\frac{\alpha}{90}\left[\frac{(n+1)m+(m+1)n}{mm}\right]$

c. $1-\frac{\alpha}{90}\left[\frac{(n-1)m-(m-1)n}{mm}\right]$

d. $1-\frac{\alpha}{90}\left[\frac{(n+1)m-(m+1)n}{mm}\right]$

Where
m = number of columns
n = number of rows
$\alpha = \tan^{-1}(d/s)$ (in degree)
s = c/c spacing of pile

02. The correct increasing order of the surface areas of the given soils is

a. Silt, sand, colloids, clay
b. Sand, silt, colloids, clay
c. Sand, silt, clay, colloids
d. Clay, silt, sand, colloids

03. For a given soil sample, C_c = coefficient of gradation C_u = coefficient of uniformity D_{10} = effective size D_{30} = diameter through which 30 per cent of the total soil mass is passing if C_c = 1.0 and C_u = 4.0 then the value of D_{30}/D_{10} would be

a. 2.00 b. 1.75
c. 1.50 d. 1.25

04. Match List I with List II and select the correct answer using the codes given below the lists:

List I (Name of person)	List II (Field of contribution)
A. Stoke	1. Flow through capillary
B. Darcy	2. Classification of soils
C. Poiseuille	3. Consistency limits
D. Atterberg	4. Flow of water through a soil mass
	5. Velocity of settling particle

a. A-5 B-4 C-1 D-3
b. A-4 B-1 C-5 D-2
c. A-1 B-5 C-4 D-2
d. A-3 B-2 C-1 D-5

05. In a standard proctor compaction, the water content (w) and maximum dry density (γ_{dmax}) are related as:

a. γ_{dmax} is linearly proportional to w
b. W is inversely proportional to γ_{dmax}
c. γ_{dmax} corresponds to a unique value of w
d. γ_{dmax} corresponds to $w = (w_p + w_L)/2$ where w_p and w_L are respectively plastic and liquid limits

06. Using Mohr's diagram, the relation between major principal stress σ_1 and minor principal stress σ_3 and shear parameters C and ϕ is given by

$\sigma_1 = \sigma_m N_\phi + 2c\sqrt{N_\phi}$ where N_Φ is equal to

a. Sin ϕ / (1 + sin ϕ)
b. Sin ϕ / (1 – sin ϕ)
c. (1 – sin ϕ) / (1 + sin ϕ)
d. (1 + sin ϕ) / (1 – sin ϕ)

07. A and B are skempton's pore pressure parameters and $\Delta\sigma_1$ and $\Delta\sigma_3$ are incremental principal stresses. Skempton's pore pressure equation is given by

a. $\Delta u = A[\Delta\sigma_3 + B(\Delta\sigma_1 - \Delta\sigma_3)]$

b. $\Delta u = B[\Delta\sigma_3 + A(\Delta\sigma_1 - \Delta\sigma_3)]$

c. $\Delta u = A[\Delta\sigma_3 + B(\Delta\sigma_1 + \Delta\sigma_3)]$

d. $\Delta u = B[\Delta\sigma_3 + A(\Delta\sigma_1 + \Delta\sigma_3)]$

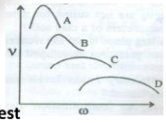
08. The total settlement of a compressible soil stratum 2 m deep and having a coefficient of volume compressibility of 0.02 cm^2/kg under a pressure increment of 2 kg/cm^2 will be

a. 2 cm
b. 4 cm
c. 8 cm
d. 10cm

09. The relationship between water content ($w^{\%}$) and number of blows (N) is soils, as obtained from casagrande's liquid limit device is given by $w = 20 - \log_{10} N$ the liquid limit of the soil is

a. 15.6%
b. 16.6%
c. 17.6%
d. 18.6%

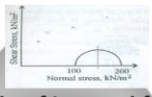
10. The results (curves A,B,C and D) of four compaction tests on different soils are shown in Fig 8.3



Tests
1. Silty sand, modified test
2. Silt sand, standard test
3. fat clay, modified test
4. Fat clay, standard test
5. Curves A, B, C and D correspond respectively to test

a. 1, 3, 2 and 4
b. 1, 2, 3 and 4
c. 2, 1, 3 and 4
d. 2, 1, 4 and 3

11. The results of a consolidated drained traxial shear test on a normally consolidated clay are shown if fog 8.4



The angle of internal friction is

a. $sin^{-1}\left(\frac{1}{3}\right)$ b. $sin^{-1}\left(\frac{1}{2}\right)$
c. $sin^{-1}\left(\frac{2}{3}\right)$ d. $sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

12. Which one of the following statements provides the best argument that direct shear tests are not suited for determining shear parameters of a clay soil

a. Failure plane is not the weakest plane.
b. Pore pressures developed cannot be measured
c. Satisfactory strain levels cannot be maintained
d. Adequate consolidation cannot be ensured.

13. Match List I with List II and select the correct answer using the codes given below the lists

List I (Pressure distribution For strutted excavation of foundation trench)	List II (Soil type)

14. Two specimens of clay A and B are tested in a consolidation apparatus. if $(m_v)_A = 3.6 \times 10^{-4}$ m^2/kN and $(m_v)_B = 1.8 \times 10^{-4}$ m^2 /kN, $(C_v)_A = 3.8 \times 10^{-4}$ cm^2 /s, $(C_v)_B = 1.9 \times 10^{-4}$ cm^2/s, then the ratio K_A / K_B is equal to

a. 0.0625
b. 0.25
c. 1.0
d. 4.0

15. terzagh's equation of ultimate bearing capacity for a strip footing may be used for square footing resting on pure clay soil with the correction factor

a. 0.4
b. 0.6
c. 1.2
d. 1.3

16. Match List I with List II and select the correct answer using the codes given below the lists:

List I (Bearing capacity terms)	List II (Definition)
A. ultimate bearing capacity	1. Net loading intensity at which neither soil fails in shear nor is there any excessive settlement
B. Net safe bearing capacity	2. The maximum pressure which soil can carry safely without risk of shear failure
C. Safe bearing capacity	3. Net ultimate bearing capacity divided by factor of safety
D. Allowable bearing pressure	4. Minimum gross pressure intensity at the base of foundation at which soil fails in shear

17. A building is supported on shallow foundation in sand at 1 m below ground level. The water table is at 5 m below the ground surface . For which one of the following foundation will the net bearing capacity of the soil be a maximum

a. 2 m wide strip footing
b. 2 m x 2 m square footing
c. 2 m diameter circular footing
d. 4 m x 1 m rectangular footing

18. The determination of ultimate bearing capacity on an eccentrically loaded square footing depends upon the concept of useful

a. Square
b. Width
c. Triangle
d. circle

19. Figure 8.6 shows the contact pressure distribution in pure clayey soil subjected to a uniformly distributed load (udl) through rigid footing (placed on the surface

Which of the following would cause the contact pressure distribution maximum at the centre and decrease towards the outer edge leading to parabolic shape

1. When udl is transmitted through rigid footing placed on the surface of a cohesionless soil
2. When udl is transmitted through flexible footing placed on the surface of a cohesive soil.
3. When udl is transmitted through flexible footing placed on the surface of a pure clay.

Select the correct answer using the codes given below

a. 1, 2 and 3
b. 1 and 2
c. 2 and 3
d. 1 alone

20. A cast-situ bored pile 0.5 m diameter and 10 m deep is placed in a purely cohesive soil. If the cohesion of the soil is 4t/m and adhesion between the pile and the soil is half the value of cohesion, then theu ltimate bearing capacity of the pile is given by

a. $\frac{19\pi}{4}$ tonnes
b. $\frac{29\pi}{4}$ tonnes
c. $\frac{39\pi}{4}$ tonnes
d. $\frac{49\pi}{4}$ tonnes

21. Match List I and List II and select the correct answer the codes given below the lists:

List I (property of soil)	List II (Laboratory equipment)
A. Grain size	1. pycnometer
B. Specific gravity	2. Permeameter
C. Coefficient of	3. Vane shear apparatus
D. Cohesion	4. Pipette
	5. Sand pouring cylinder

a. A-4 B-1 C-2 D-3
b. A-4 B-5 C-2 D-3
c. A-5 B-1 C-2 D-4
d. A-1 B-5 C-3 D-2