University of Mumbai
Examination 2021
Examinations Commencing from 1 June 2021
Program: **BE Civil Engineering**
Curriculum Scheme: Rev 2016
Examination: TE Semester VI
Course Code: CE-C601 and Course Name: Geotechnical Engineering -II

Time: 2 hour   Max. Marks: 80

==

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	A clay deposits suffers a total settlement of 10 cm with one way drainage, then with two way drainage, it suffers a total settlement of
Option A:	20 cm
Option B:	5 cm
Option C:	10 cm
Option D:	15 cm
2.	The triaxial test in which drainage is permitted initially till full primary consolidation take place, and later no drainage is permitted during shearing stage is called
Option A:	Unconsolidated Undrained test
Option B:	Consolidated Undrained test
Option C:	Consolidated Drained test
Option D:	Unconsolidated Drained test
3.	If $\alpha = 90^0$, the value of inclination factor (i_c) will be
Option A:	1
Option B:	0.75
Option C:	0.5
Option D:	0
4.	If the gross bearing capacity of a strip footing 1.5m wide located at a depth of 1m in clay is 400 kN/m² Its net bearing capacity for unit weight 20 kN/m³ is
Option A:	370 kN/m²
Option B:	390 kN/m²
Option C:	380 kN/m²
Option D:	360 kN/m²
5.	In very soft clayey soil the shear failure is generally
Option A:	General Shear Failure
Option B:	Local Shear Failure
Option C:	Punching Shear Failure
Option D:	Mixed Shear Failure

6.	The downward drag acting on a pile due to the movement of the surrounding is called
Option A:	Skin friction
Option B:	Negative skin friction
Option C:	Frictional force
Option D:	Neutral forced
7.	Under-reamed piles are generally
Option A:	Driven piles
Option B:	Bored piles
Option C:	Precast piles
Option D:	Bearing piles
8.	Dynamic formulae are best suited for _____ type of soil
Option A:	Fine-grained soil
Option B:	Coarse-grained soil
Option C:	Cohesive soil
Option D:	Clayey soil
9.	The general shear failure occurs in soil if relative density is greater than
Option A:	70
Option B:	60
Option C:	50
Option D:	45
10.	The coefficient of compressibility is the ratio of
Option A:	Change in void ratio to change in effective stress
Option B:	Volumetric strain to change in effective stress
Option C:	Change in thickness to change in effective stress
Option D:	Stress to strain
11.	Under load, the void ratio of a submerged saturated clay decreases from 1.0 to 0.92. the ultimate settlement of a layer 2 m thick layer will be
Option A:	2 cm
Option B:	4 cm
Option C:	16 cm
Option D:	8 cm
12.	A shallow foundation is usually defined as a foundation which has
Option A:	Depth less than 0.6m
Option B:	Depth less than or equal to its width
Option C:	Depth less than 1m
Option D:	Depth greater than width
13.	The value of shape factor S_c, S_q and S_γ for circular base is _____
Option A:	1.3, 1.2, 0.8

Option B:	1.3, 1.2, 0.6
Option C:	1.0, 1.0, 1.0
Option D:	1.2, 1.0, 1.3
14.	The standard penetration resistance is determined at a number of selected points at interval of
Option A:	80 cm
Option B:	100 cm
Option C:	75 cm
Option D:	10 cm
15.	In general shear failure, continuous failure developed between
Option A:	Ground surface and footing
Option B:	Foundation and the ground surface
Option C:	Middle of the footing
Option D:	Edge of the footing and ground surface
16.	As per IS Code, maximum permissible differential settlement of clayey soil is
Option A:	25 mm
Option B:	40 mm
Option C:	65 mm
Option D:	100 mm
17.	The seating load for plate load test is_____
Option A:	2 kN/m^2
Option B:	3 kN/m^2
Option C:	4 kN/m^2
Option D:	7 kN/m^2
18.	The bearing capacity of a single pile in clay is mainly due to _____
Option A:	Friction
Option B:	Shear strength of soil
Option C:	Allowable load
Option D:	Ultimate load
19.	If an infinite slope of clay at a depth of 5 m has mobilized cohesion of 10 KN / m^2 and unit weight of 20 kN/ m^2 compute the stability number
Option A:	0.05
Option B:	0.1
Option C:	0.25
Option D:	0.35
20.	Identify the incorrect statement the stability of a slope is decreased by
Option A:	Removal of a part of slope by excavation
Option B:	Shock caused by earthquake
Option C:	Pore water pressure in the soil
Option D:	Providing a berm at the toe

Q2.	Solve any Four out of Six	5 marks each
A	Describe briefly about the different failure condition in checking the stability of gravity retaining wall	
B	Derive relation between angle shear strength parameter and principal stresses at failure.	
C	A column carries a load of 1000 kN. Soil is dry sand of unit weight 19 kN/m^3 and $\varphi = 40°$, factor of safety = 2.5 is required, $N_\gamma = 42$, $N_q = 21$. Find size of square footing, depth of footing =1m and water table at ground surface. Take γ_{sat} =21 kN/m^3	
D	A square concrete pile 30 cm x 30 cm is driven into homogeneous loose sand layer having $\gamma =18$ kN/m^3 and $\varphi = 30°$ for depth of 12 m. Calculate safe load on the pile, Take k= 1.3, $N_q = 29$, $\delta= 18°$ and FOS= 3	
E	In a normally consolidated clay of L.L. = 65.5 % and 5 m thickness, the overburden pressure is increased from 250 kN/m^2 by 120 kN/m^2. Estimate the settlement that takes place, Assume the saturated water content of 45%.	
F	A 5m deep canal has side slope of 1:1, the properties of soil are c = 20 kN/m^2, $\varphi = 40°$, e = 0.88, G= 2.65, if Taylors stability number is 0.108 determine Factor of safety with respect to cohesion. When canals run full and also find the same in case of sudden drawdown if Taylor stability number for this condition is 0.137.	

Q3.	Solve any Four out of Six	5 marks each
A	Define the following: i) Compression index ii) Expansion index iii) Coefficient of volume compressibility iv) Coefficient of compressibility v) Coefficient of consolidation	
B	Triaxial test was conducted on a C-☐ soil, the chamber pressure was 250 kPa and failure occurred at an additional axial pressure of 350 kPa. If failure plane makes an angle of 52° with horizontal, find the shear parameters for this soil; also find normal and shear stress on failure plane.	
C	Explain effect of water table on Bearing capacity of shallow foundation?	
D	A retaining wall having smooth vertical back is retaining purely cohesive soil. Calculate the depth at which the intensity of active pressure is zero. Consider height of wall = 12m, c = 0.11 kg/cm2, γ =2.04 kg/cm3. What will be the critical depth of excavation in this soil?.	
E	Derive an expression for factor of safety for slope of cohesionless soil for condition of dry, submerged and steady seepage parallel to slope.	
F	A group of 9 piles arranged in square pattern with diameter and length of each pile as 25 cm and 10 m respectively is used as foundation in soft clay. Take c = 20 kN/m^2 and pile spacing is 100 cm centre to centre. Find the load capacity of the group. Assume $N_c = 9$, $\alpha = 0.75$, FOS = 2.5.	