University of Mumbai
Examination Second Half 2021

Curriculum Scheme: Rev-2019 (C Scheme)
Examination: TE Semester VI

CEC 603 GEOTECHNICAL ENGINEERING-II

Time: 2hour 30 minutes Max. Marks: 80

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A cohesionless soil having an angle of shearing resistant of φ, is standing at a slope angle of i. The factor of safety of the slope is
Option A:	tani/tanΦ
Option B:	tani - tanΦ
Option C:	tanΦ/tani
Option D:	tanΦ - tani
2.	The passive earth pressure of a soil is proportional to
Option A:	tan (45-ϕ)
Option B:	tan (45+ ϕ)
Option C:	$\tan^2$ (45-ϕ)
Option D:	$\tan^2$ (45+ϕ)
3.	Coefficient of consolidation of a soil is affected by
Option A:	Compressibility and Permeability of soil
Option B:	Compressibility only
Option C:	Permeability only
Option D:	Compaction
4.	The percentage reduction in the bearing capacity of a strip footing resting on sand when the water level is at the base of the footing and when the water level is at a depth much greater than the width of footing, is approximately.
Option A:	5
Option B:	25
Option C:	50
Option D:	75
5.	The factor of safety Fc with respect to cohesive strength is based on the assumption that _____
Option A:	Frictional force is fully mobilized
Option B:	Frictional force is zero
Option C:	Total cohesive resistance is zero
Option D:	Both friction and cohesion are mobilized
6.	A square pile 300 mm size penetrates soft clay with cohesion of 85 KPa and a depth of 18 m and rest on stiff soil. Determine the capacity of pile by skin friction. Assume an adhesion factor of 0.75
Option A:	1085 kN
Option B:	1377 kN
Option C:	1550 kN
Option D:	1455 kN

7.	For a sand having an angle of internal friction of 22°, the ratio of active to lateral earth pressure will be.
Option A:	0.482
Option B:	0.206
Option C:	0.166
Option D:	0.111
8.	The plate load test is conducted on clayey strata by using a plate of 0.45m×0.45 m dimensions, and the ultimate load per unit area for the plate is found to be 200 KPa. The ultimate bearing capacity of a 2.2 m wide square footing would be
Option A:	180 kPa
Option B:	450 kPa
Option C:	220 kPa
Option D:	200 kPa
9.	By which process some compression of soil takes place, after the hydrostatic pressure reduces to zero?
Option A:	Secondary consolidation
Option B:	Primary consolidation
Option C:	Load increment
Option D:	Effective pressure
10.	Basement walls are generally designed for
Option A:	Active pressure
Option B:	Passive pressure
Option C:	At rest pressure
Option D:	Lateral pressure

Q2.	
A	**Solve any Two** **5 marks each**
i.	Explain pre consolidation pressure with appropriate figure.
ii.	Derive an expression for the factor of safety when the slope of an earthen dam is dry. Assume the soil to possess both cohesion and friction.
iii.	What are the three standard triaxial shear tests with respect to drainage conditions? Explain with reasons the situations for which each test is to be preferred.
B	**Solve any One** **10 marks each**
i.	A layer of soft clay is 7 m thick and lies under a newly constructed building. The weight of sand overlying the clayey layer produces a pressure of 240kN/m2 and the new construction increases the pressure by 100kN/m2. If the compression index is 0.45, compute the settlement. Water content is 41% and specific gravity of grains is 2.65
ii.	A cylindrical sample of saturated clay 4cm in diameter and 8cm high was tested in an unconfined compression apparatus. Find the unconfined compression strength, if the specimen failed at an axial load of 360N, when the axial deformation was 8mm. Find the shear strength parameters if the angle made by the failure plane with the horizontal plane was recorded as 50^0. Verify results graphically.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Determine the active and passive earth pressure given the following data: Height of the retaining wall = 10m, angle of internal friction of the backfill soil is 25° and dry unit weight of backfill is 17kN/m3. Ground water table is at the top of the retaining wall.
ii.	Compare Rankine's and Coulombs lateral earth pressure theory.

iii.	State assumptions in Terzaghi's bearing capacity analysis. Explain effect of water table on the bearing capacity of soil.
B	**Solve any One** **10 marks each**
i.	A concrete pile 350 mm diameter is driven into dense sand for a depth of 8.5. Estimate: (i)The safe load acting on the pile. (ii) Safe load if the water table exists at 2 m below the ground surface. Consider following properties of the sand: angle of internal friction=35 0 , unit weight = 20 kN/m3 , coefficient of friction between sand and pile=0.7,coefficient of earth pressure = 1.
ii.	Compute the safe bearing capacity of a continuous footing 1.8m wide and located at a depth of 1.2m below ground level in a soil with unit weight 20 kN/m3, c = 20kN/m2 and angle of internal friction 20°. Assume a factor of safety of 2. Terzaghi's bearing capacity factors for angle of internal friction (=20°) are Nc = 17.7 Nq = 7.4 and Nγ = 5.0. What is the permissible load per meter run of the footing?

Q4.	
A	**Solve any Two** **5 marks each**
i.	Explain Swedish Circle Method for cohesive soil for stability analysis of slopes.
ii.	Define Initial consolidation, Primary consolidation and Secondary consolidation.
iii.	What are the causes and effects of Negative skin friction? Explain the remedial measures to minimize it.
B	**Solve any One** **10 marks each**
i.	Explain classification of Pile Foundation. Show how the static bearing capacity of the Pile foundations can be estimated.
ii.	A cantilever retaining wall of 7meter height retains sand. The properties of the sand are void ratio = 0.5, angle of internal friction = 30° and specific gravity =2.7. Using Rankine's theory determine the active earth pressure at the base when the backfill is (1) dry, (2) saturated (3) submerged and also the resultant active force in each case.