P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination
November 2022
SECV3011 Soil Mechanics & Foundation Engineers

22.11.2022, Tuesday   Time: 10:00 a.m. To 12:30 p.m.   Maximum Marks: 60

Instructions:
1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

		[05]	CO	BTL
Q - 1	Answer the followings. (Any Five)			
(i)	At a site, the cohesive fill needs to be compacted by mechanical means. Which rollers are suitable for this work?		4	5
	(a) Sheep -foot rollers			
	(b) Tamping			
	(c) Smooth wheeled Rollers			
	(d) All the above			
(ii)	What is the effect of increasing the compaction energy on compaction characteristics of a given soil? (with usual notation)		4	2
	(a) decrease MDD, increase OMO			
	(b) decrease OMC, increase MDD			
	(c) increase OMC and MDD			
	(d) decrease OMC and MDD			
(iii)	The shear strength in cohesion less soil is due to _____.		2	6
	(a) Internal friction			
	(b) Cohesion			
	(c) Intergranular friction			
	(d) Interparticle force			
(iv)	Major principal stress in a soil is represented by the symbol _____.		2	3
	(a) $\sigma 1$			
	(b) $\sigma 2$			
	(c) $\sigma 3$			
	(d) $\sigma 4$			
(v)	The consolidation settlement can be computed by _____.		1	2
	(a) using the coefficient of volume change only			
	(b) using the voids ratio only			
	(c) using both Using coefficient of volume change and voids ratio			
	(d) using compression index only			
(vi)	In case of pre-consolidated soil, the final settlement is _____		1	6
	(a) small			
	(b) negligible			
	(c) large			
	(d) Very large			
(vii)	A soil that is not fully consolidated is called _____		1	3
	(a) normally consolidated			
	(b) pre-consolidated			

(c) over- consolidated

(d) under-consolidated

Q - 2 (a) List out Different factors affecting on compaction and explain in brief. [05] 4 2

Q - 2 (b) Write merits and demerits of triaxial test. [05] 3 2

OR

Q - 2 (a) A soil sample fails under an axial stress of 150 kN/m², when it is laterally unconfined. The failure makes an angle of 55° with the horizontal. Calculate C and Φ value. [05] 2 5

Q - 2 (b) A soil sample has OMC of 15% and bulk density of 1.84 gm/cc. Determine the following: Void ratio, porosity, % of saturation and maximum dry density. Assume G = 2.70. [05] 4 5

Q - 3 (a) Explain consolidation settlement in detail. [05] 1 4

Q - 3 (b) Calculate the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where total normal stress is 150 kN/m² and pore water pressure is 40 kN/m². The effective shear strength parameters for the soil are $c' = 20$ kN/m² and $\Phi' = 32°$. [05] 2 5

OR

Q - 3 (a) Explain in detail Mohar-Coulomb's Strength theory. [05] 2 2

Q - 3 (b) How to determinate pre- consolidation pressure? Explain. [05] 1 2

Q - 4 Attempt any one. [05]

(i) Different between compaction and consolidation. 1 6

(ii) Explain spring analogy for primary consolidation. 1 2

SECTION – II

Q - 1 Answer the Following. (Any Five) [05]

(i) The coefficient of active earth pressure is _____ the coefficient of passive pressure.

(a) less than (b) greater than (c) equal 1

(ii) What are the types of shear failure? 2 2

(iii) The action of negative skin friction on the pile is to _____

(a) reduce the allowable load on the pile (b) increase the ultimate load on the pile

(c) reduce the settlement of the pile

(iv) Define ultimate bearing capacity? 5 1

(v) According to Rankin's theory the value of 'c' for cohesion less soil is _____ 1

(a) 0 (b) 0.5 (c) 1

(vi) Sheet piles are commonly used as _____ in hydraulic structure. 5 6

(a)Bulk heads

(b) Bearing stratum

(c) Boulders

(vii) Define differential settlement. 5 1

Q - 2 (a) Explain the Rankine's theory of passive earth pressure for cohesionless backfill. [05] 6

Q - 2 (b) A retaining wall 10 m high retains a cohesionless soil having an angle of internal friction of 35 degree. The surface of the soil is level with the top of the wall. The top 3 m of the fill has a unit weight of 16 kN/m³ and that of the rest is 20 kN/m³. Find the magnitude per meter run and point of application of the resultant active thrust. Assume Φ the same for both strata. [05] 5

OR

Q - 2 (a) Discuss the different bearing capacity failures of footing. [05] 5 6

Q - 2 (b)	Write the assumption and limitations of Terzaghi's bearing capacity theory.	[05]	5	6
Q - 3 (a)	Write a note on "Pile load test".	[05]	5	2
Q - 3 (b)	Write short note on Negative skin friction in Pile.	[05]	5	2

OR

Q - 3 (a)	What is gross bearing capacity? Explain total and differential settlement.	[05]	5	2
Q - 3 (b)	Write short note on coulomb's wedge theory.	[05]		6
Q - 4	Attempt any one.	[05]		
(i)	Discuss the criteria to select the location and depth of shallow foundation.		5	2
(ii)	Differentiate the friction piles and end bearing piles.		5	3

****

CO   : Course Outcome Number   BTL   : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create