## P P SAVANI UNIVERSITY

## Fifth Semester of B. Tech. Examination December 2021

SECV3011 Soil Mechanics & Foundation Engineering

2.12.2021, Thursday

1. The question paper comprises of two sections.

Instructions:

Time: 09:00 a.m. To 11:30 a.m.

Maximum Marks: 60

Make s	uitable assumptions and		ate answer		ired				
	scientific calculator is al		inguites which	rever requ	irea.				
0.1	A	(A F:)	SECTIO	$\frac{N-1}{N}$					
Q-1	Answer the Following.				01				
(i)	For Modified compaction test done on soil, the mass and drop of hammer are								
(**)	(a) 5.4 kg and 450 mm (b) 2.60 kg and 310 mm (c) 2.6 kg and 450 mm								
(ii)	What is consolidation?								
(iii)	Triaxial test use for which kind of soil?								
(iv)	Minor principal stress in a soil is represented by the symbol								
(v)	In a compaction test	, as the cor	mpaction ef	fort is inc	reased, the	maximum	dry density	1	
	(a) decreases (b) rem	nain same (	c)increases						
(vi)	Define shear strength o	f soil.							
(vii)	Between what the virgi	n compression	on curve is a	curve?					
	(a) the voids ratio and t	the effective p	pressure						
	(b) the effective pressu	re and the tot	al pressure						
	(c) the effective pressur	re and the no	re precure						
		The state of the s							
Q - 2 (a)	In a soil compaction tes	The state of the s		obtained.					
Q - 2 (a)	In a soil compaction tes	st following r	results were		1.5	10			
Q - 2 (a)	In a soil compaction tes  Moisture Content,	Control of the Contro		obtained.	15	18	21		
Q - 2 (a)	In a soil compaction tes	st following r	results were		15	18	21		
Q - 2 (a)	In a soil compaction test Moisture Content, %	st following r	9.6	12					
Q - 2 (a)	In a soil compaction tes  Moisture Content,	st following r	results were		15	18	17.0		
Q - 2 (a)	In a soil compaction test  Moisture Content,  %  Bulk Density,	st following r	9.6	12					
Q - 2 (a)	In a soil compaction test  Moisture Content,  %  Bulk Density,	8.8	9.6 13.19	12					
	In a soil compaction test  Moisture Content,  %  Bulk Density, kN/m3	8.8 12.62 and obtain O	9.6 13.19 MC & MDE	15.6					
	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve	8.8 12.62 and obtain O	9.6 13.19 MC & MDE	12 15.6 0. two types.					
Q - 2 (b)	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve List out different type of	8.8  12.62  and obtain O of rollers and	9.6  13.19  MC & MDE explain any	12 15.6  0. two types. R	17.2	17.5	17.0		
Q - 2 (b)	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve List out different type of	8.8  12.62  and obtain O of rollers and the void ratio	9.6  13.19  MC & MDE explain any On of the spec	12 15.6  2. two types. R  cimen which	17.2	17.5	17.0		
Q - 2 (b)	In a soil compaction test  Moisture Content,  %  Bulk Density, kN/m3  Plot compaction curve List out different type of  In a consolidation test, of 214 kN/m2, changed	8.8  12.62  and obtain O of rollers and the void ratio d to 0.994 where the state of the state o	9.6  13.19  MC & MDE explain any On of the spechen the press	12 15.6  2. two types. R cimen which sure was in	17.2 h was 1.068 creased to 4	17.5 under the e	17.0  ffective stress Calculate the		
Q - 2 (b)	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve List out different type of  In a consolidation test, of 214 kN/m2, changed co-efficient of compress	8.8  12.62  and obtain O of rollers and the void ratio d to 0.994 which is the void ratio of the void	9.6  13.19  MC & MDE explain any  On of the specthen the pression indee	12 15.6  2. two types.  R  2. timen which sure was in x and the co	h was 1.068 creased to 40-efficient of	under the e 429 kN/m². f volume co	17.0  ffective stress Calculate the		
Q - 2 (b)	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve List out different type of In a consolidation test, of 214 kN/m2, changed co-efficient of compress Find the settlement of the	8.8  12.62  and obtain O of rollers and the void ratio d to 0.994 which is to 0.994 when the foundation of the foundatio	9.6  13.19  MC & MDE explain any  On of the specthen the pression indeen resting on a	12 15.6  2. two types.  R  2. timen which sure was in x and the co	h was 1.068 creased to 40-efficient of	under the e 429 kN/m². f volume co	17.0  ffective stress Calculate the		
Q - 2 (a) Q - 2 (b) Q - 2 (a)	In a soil compaction test  Moisture Content,  %  Bulk Density, kN/m3  Plot compaction curve List out different type of  In a consolidation test, of 214 kN/m2, changed co-efficient of compress Find the settlement of the settlemen	8.8  12.62  and obtain O of rollers and the void ratio d to 0.994 which is the foundation is the foundation is the foundation of the foundation is the found	9.6  13.19  MC & MDE explain any  on of the specthen the pression indeen resting on a styre.	12 15.6  O. two types.  R  Simen which sure was in x and the coabove type of	h was 1.068 creased to 2-efficient of clay, if th	under the e 429 kN/m². f volume co ickness of the	17.0  ffective stress Calculate the mpressibility he layer is 8m		
Q - 2 (b) Q - 2 (a)	In a soil compaction test  Moisture Content, %  Bulk Density, kN/m3  Plot compaction curve List out different type of In a consolidation test, of 214 kN/m2, changed co-efficient of compress Find the settlement of the	8.8  12.62  and obtain O of rollers and the void ratio d to 0.994 which is the foundation is the foundation is the foundation of the foundation is the foundation of the foundation is the foundation is the foundation of the foundation is the foundation of the foundation is the foundation of the foundation of the foundation is the foundation of the found	9.6  13.19  MC & MDE explain any  on of the specthen the pression indeen resting on a styre.  ard proctor to a specthen the pression indeen resting on a styre.	12 15.6  O. two types.  R  Simen which sure was in x and the coabove type of the coabo	h was 1.068 creased to 2-efficient of clay, if th	under the e 429 kN/m². f volume co ickness of the	17.0  ffective stress Calculate the mpressibility he layer is 8m		

Q-3 (b) A standard specimen of cohesion less sand was tested in triaxial compression and the sample

under a cell pressure of 200 kN/m<sup>2</sup>?

failed at a deviator stress of  $482~kN/m^2$ , when the cell pressure was  $100~kN/m^2$ , under drained condition. Find the effective angle of shearing resistance of sand. What would be the deviator stress and the major principal stress at failure for another identical specimen of sand it is tested

<ul> <li>Q - 3 (b) Define coefficient of compressibility and coefficient of volume change with equation.</li> <li>Q - 4 Attempt any one/two.</li> <li>(i) In a consolidation test, the void ration of the specimen which was 1.068 under the effective of 214 kN/m², changed to 0.994 when the pressure was increased to 429 kN/m². Calculate the efficient of compressibility, compression index and the co-efficient of volume compression.</li> </ul>	he co- bility.
(i) In a consolidation test, the void ration of the specimen which was 1.068 under the effective of 214 kN/m², changed to 0.994 when the pressure was increased to 429 kN/m². Calculate the efficient of compressibility, compression index and the co-efficient of volume compression.	[05] stress he co- bility.
(i) In a consolidation test, the void ration of the specimen which was 1.068 under the effective of 214 kN/m², changed to 0.994 when the pressure was increased to 429 kN/m². Calculate the efficient of compressibility, compression index and the co-efficient of volume compression.	stress he co- bility.
of 214 kN/m <sup>2</sup> , changed to 0.994 when the pressure was increased to 429 kN/m <sup>2</sup> . Calculate the efficient of compressibility, compression index and the co-efficient of volume compression.	he co- bility.
efficient of compressibility, compression index and the co-efficient of volume compressi	bility.
Find the settlement of the foundation resting on above type of clay, if thickness of the layer	10 0111
and the increase in pressure is 10 kN/m <sup>2</sup> .	
(ii) Differentiate the consolidation and compaction of soil.	
SECTION – II	
Q - 1 Answer the Following. (Any Five)	1051
(i) The coefficient of active earth pressure is the coefficient of passive pressure is	[05]
(a) less than (b) greater than (c) equal	iie.
(ii) What are the types of shear failure?	
(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?	
(v) According to Rankin's theory the value of 'c' for cohesion less soil is	
(a) 0 (b) 0.5 (c) 1	
(vi) Sheet piles are commonly used as in hydraulic structure.  (a)Bulk heads	
(b) Bearing stratum (c) Boulders	
(vii) Define differential settlement.	
Q - 2 (a) Explain the Rankine's theory of passive earth pressure for cohesionless backfill.	[05]
Q - 2 (b) A retaining wall 10 m high retains a cohesionless soil having an angle of internal friction of	
degree. The surface of the soil is level with the top of the wall. The top 3 m of the fill has a	
weight of 16 kN/m <sup>3</sup> and that of the rest is 20 kN/m <sup>3</sup> . Find the magnitude per meter run and	
of application of the resultant active thrust. Assume $\Phi$ the same for both strata.	
OR	
Q - 2 (a) Discuss the different bearing capacity failures of footing.	[05]
Q - 2 (b) Write the assumption and limitations of Terzaghi's bearing capacity theory.	[05]
Q - 3 (a) Write a note on "Pile load test".	[05]
Q - 3 (b) Write short note on Negative skin friction in Pile.	[05]
OR	4 0
Q - 3 (a) What is gross bearing capacity? Explain total and differential settlement.	[05]
Q - 3 (b) Write short note on coulomb's wedge theory.	[05]
Q - 4 Attempt any one/two.	[05]
(i) Discuss the criteria to select the location and depth of shallow foundation.	[]
(ii) Differentiate the friction piles and end bearing piles.	

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## P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination December 2021

SECV3011 Soil Mechanics & Foundation Engineering

2.12.2021, Thursday Time: 09:00 a.m. To 11:30 a.m. Maximum Marks: 60

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

	SECTION - I			
Q-1	Answer the Following. (Any Five)			
(i)	Equation to find coefficient of active earth pressure is			
(ii)	Define general shear failure?			
(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 net ultimate bearing capacity?			
(v)	According to Rankin's theory the value of 'c' for cohesion less soil is			
	(a) (a) 0 (b) 0.5 (c) 1			
(vi)	Define fender pile.			
(vii)	Between what the virgin compression curve is a curve?			
	(a) the voids ratio and the effective pressure			
	(b) the effective pressure and the total pressure			
	(c) the effective pressure and the pore pressure			
Q - 2(a)	Explain the test procedure of standard proctor test.	[05]		
Q - 2(b)	Discuss the different factor affecting compaction of the soil.	[05]		
	OR			
Q - 2 (a)	An undisturbed sample of a clay stratum, 2 m thick, was tested in the laboratory and the average value of coefficient of consolidation was found to be $2 * 10^{-4}$ cm <sup>2</sup> /sec. If a structure is built on the clay stratum, how long will it take to attain half the ultimate settlement under the load of the structure? Assume double drainage.	[05]		
Q - 2(b)	Explain the Terzaghi's spring analogy theory	[05]		
Q - 3 (a)	Describe Vane shear test.	[05]		
Q-3(b)	A standard specimen of cohesion less sand was tested in triaxial compression and the sample	[05]		
	failed at a deviator stress of 482 kN/m <sup>2</sup> , when the cell pressure was 100 kN/m <sup>2</sup> , under drained condition. Find the effective angle of shearing resistance of sand. What would be the deviator stress and the major principal stress at failure for another identical specimen of sand it is tested under a cell pressure of 200 kN/m <sup>2</sup> ?			
	OR			
Q-3(a)	Explain different drainage condition applied in the shear test.	[05]		
Q - 3(b)	Define coefficient of compressibility and coefficient of volume change with equation.	[05]		
Q-4	Attempt any one.	[05]		
(i)	Describe Logarithm of time fitting method.	[00]		
(ii)	Differentiate the consolidation and compaction of soil.			
	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	
(ii)	What are the types of shear failure?	
(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?	
(v)	According to Rankin's theory the value of 'c' for cohesion less soil is  (a) 0 (b) 0.5 (c) 1	
(vi)	Sheet piles are commonly used as in hydraulic structure.  (a)Bulk heads	
	(b) Bearing stratum	
	(c) Boulders	
(vii)	Define differential settlement.	
Q - 2 (a)	Explain difference between active & passive earth pressure.	[05]
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 $16 \text{ kN/m}^3$ and that of the rest is $20 \text{ kN/m}^3$ . Find the magnitude per meter run and point of application of the resultant active thrust. Assume $\Phi$ the same for both strata.	[05]
	OR	
Q - 2 (a)	Discuss the different bearing capacity failures of footing.	[05]
Q-2 (b)	Write the assumption and limitations of Terzaghi's bearing capacity theory.	[05]
Q - 3 (a)	Write a note on "Pile load test".	[05]
Q-3(b)	What are the factors affecting of pile foundation?	[05]
0.00	OR	
Q - 3 (a)	What is gross bearing capacity? Explain total and differential settlement.	[05]
Q - 3 (b)	What are the assumptions of Rankine's theory?	[05]
Q-4	Attempt any one.	[05]
(i)	Define critical depth.	
(ii)	Differentiate the friction piles and end bearing piles. Show the earth pressure distribution for submerged backfill	

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