Hall Ticket Number:

Code No. : 17152 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Civil Engg.) VII-Semester Main & Backlog Examinations, Dec.-23/Jan.-24

Foundation Engineering (PE-II)

Time: **3 hours** Max. Marks: **60**

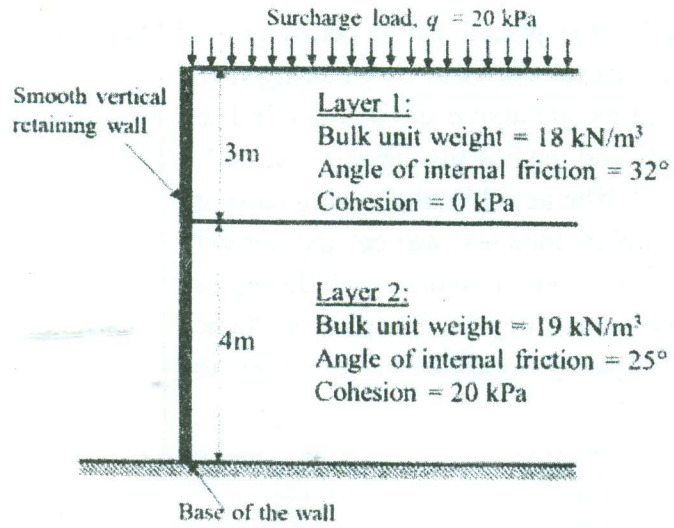
*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	List the external stability conditions one should consider for the design of gravity retaining walls	2	1	1	1
2.	State what is a face failure with a brief sketch labelled	2	1	1	1
3.	How sheet piles are driven into the ground to form a continuous wall?	2	1	2	1
4.	What do you mean by a flexible retaining wall?	2	1	2	1
5.	State one major disadvantage to circumvent site investigation of a project	2	1	3	1
6.	How do you determine the value of Modulus of Resilience of a soil?	2	1	3	1
7.	State any three main theories to determine bearing capacity under shear criteria	2	1	4	1
8.	In case of sandy soil if a GWT rises from a deep level under the foundation to the ground surface, state how would the bearing capacity vary with respect to the initial value before the rise of GWT.	2	2	4	1,2
9.	Discuss classification of piles under any one school of thought	2	2	5	1,2
10.	List different types of well foundations	2	1	5	1

Part-B (5 × 8 = 40 Marks)

11. a)	Solve for active earth pressure at the base of the retaining wall as shown in the figure	4	3	1	1,2



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b)	Summarize your understanding on Swedish slip circle method of determining factor of safety of a given slope using neat and labelled sketch	4	2	1	1
12. a)	Summarize the apparent earth pressure diagrams used for design of bracings in sands and clay deposits with neat labelled pressure distribution diagrams	3	2	2	1
b)	Discuss in detail about the step-by-step process of determining design depth of a cantilever sheet pile in a sandy soil deposit. Also demonstrate the net pressure diagram with clear labelling	5	2	2	1,2
13. a)	A site in your college of 1.2 hectares is proposed to have an auditorium building with 2 basements and G.F + 4 floors Demonstrate entire scheme of investigation with a special mention on following i. Number, depth, and location of open pits/bore holes. ii. List of field and laboratory tests. iii. List of contents in a bore log. iv. Sample sketch of borelog	5	3	3	1,2,10 ,11
b)	Illustrate the organization of any one method of geophysical investigation methods with a neat and labelled sketch	3	3	3	2
14. a)	A square footing of size 2.5m x 2.5m is placed 1.0 m below ground surface on a cohesionless homogenous soil stratum. Considering GWT is located at base of the footing, unit weight above and below GWT are 18kN/m3 and 20kN/m3 respectively and the bearing capacity factor Nq is 58, unit weight of water 10kN/m3. The net ultimate bearing capacity is estimated as 1706 kPa. Earlier, a plate load test was carried out with a circular plate of 30 cm diameter in the same foundation pit during dry season, when the water table was located beyond the plate influence zone. Using Terzaghi's bearing capacity formulation solve for the ultimate bearing capacity in kPa.	4	3	4	1,2

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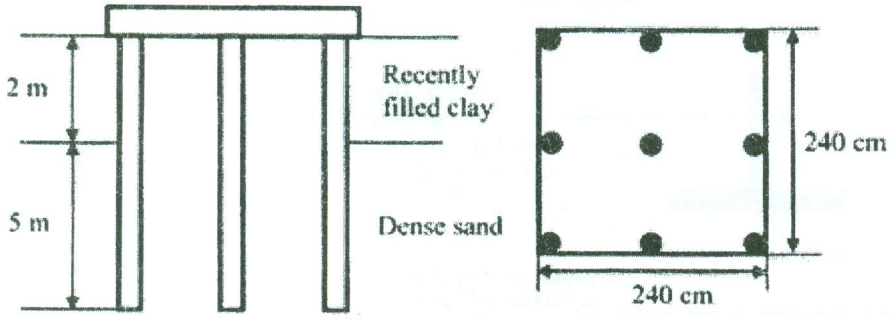
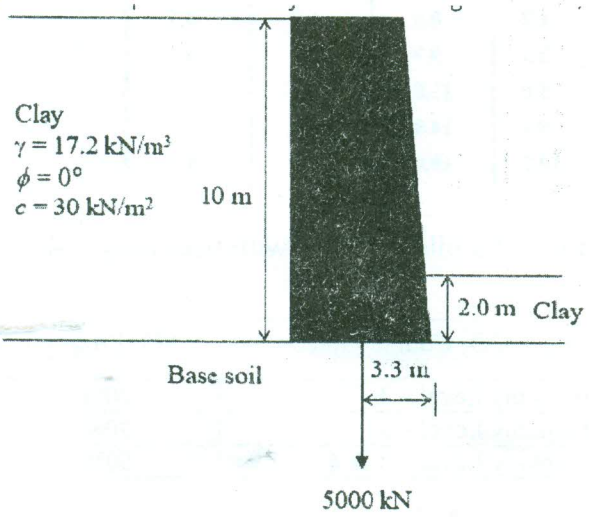
b)	Illustrate the detail organization of a plate load test with necessary plots, sketches and labelling.	4	3	4	1
15. a)	A group of nine piles in a 3x3 square pattern is embedded in a soil stratum comprising dense sand underlying recently filled clay layer as shown in figure. The perimeter of an individual pile is 126cm. The size of pile group is 240cm x 240 cm. The recently filled clay has undrained shear strength of 15 kPa and unit weight of 16 kN/m3.Calculate the negative skin friction load in kN acting on the pile group. 	4	4	5	1,2
b)	A single vertical friction pile of diameter 500mm and length 20m is subjected to vertical compressive load. The **pile** is embedded in a homogeneous sandy stratus where angle of shearing resistance is 30°, unit density =20kN/m3 and angle of wall friction is 2/3 of angle of shearing resistance, coefficient of lateral earth pressure 2.7 and bearing capacity factor Nq=25. Compute the skin resistance, tip resistance and ultimate capacity of pile.	4	4	5	1,2
16. a)	A retaining wall of height 10m with clay backfill is shown in figure weight of retaining wall is 5000 kN/m acting at 3.3m from the toe of the retaining wall. The interface friction angle between base of the retaining wall and base soil is 20°. The depth of clay in front of retaining wall in 2.0m. Assuming that the tension crack is fully developed and using Rankines theory demonstrate the factor of safety against sliding failure after ignoring passive resistance generated by clay in front of wall. 	4	3	1	1,2

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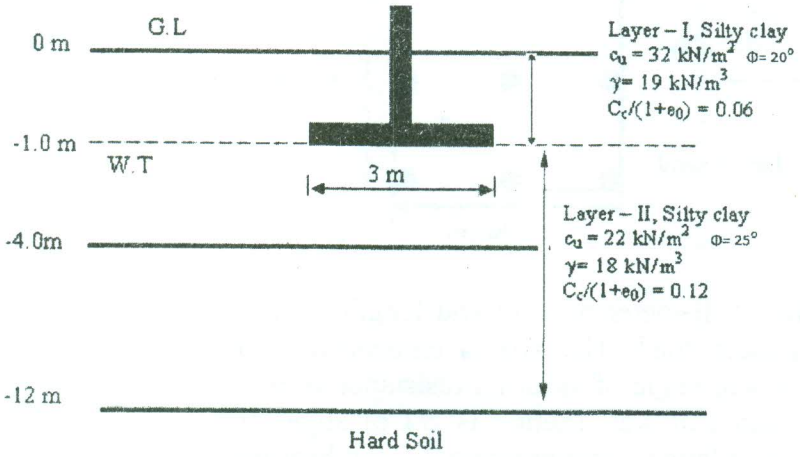
b)	With necessary pressure diagrams and expressions explain step by step design process in detail of an anchored sheet pile wall embedded in cohesive soil.	4	2	2	1,2,3
17.	Answer any ***two*** of the following:				
a)	Explain the following with neat sketches. i) Auger boring ii) Percussion boring	4	2	3	1
b)	 Consider shallow foundation in the figure failing under **Local Shear Failure** condition. Calculate net safe bearing capacity with a FOS 1.5 when Ground water level is at -1m elevation.	4	4	3	1,2,3
c)	Demonstrate the detailed organization of a pile load test with necessary plots, sketches neatly labelled.	4	4	3	1

Φ	*General shear failure*			*Local shear failure*		
	N_c	N_q	N_γ	N_c'	N_q'	N_γ'
0	5.7	1.0	0.0	5.7	1.0	0.0
5	7.3	1.6	0.5	6.7	1.4	0.2
10	9.6	2.7	1.2	8.0	1.9	0.5
15	12.9	4.4	2.5	9.7	2.7	0.9
20	17.7	7.4	5.0	11.8	3.9	1.7
25	25.1	12.7	9.7	14.8	5.6	3.2
30	37.2	22.5	19.7	19.0	8.3	5.7

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30&
iii)	Blooms Taxonomy Level – 3 & 4	50%

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