



COLLEGE OF ENGINEERING, PUNE

(An Autonomous Institute of Government of Maharashtra.)
SHIVAJI NAGAR, PUNE - 411 005

END Semester Examination

Advanced Geotechnical engineering (CE-DE 14004)

Course: B.Tech

Branch: Civil Engineering

Semester: Sem VII

Year: 2014-2015

Max.Marks:60

Duration: 3 Hours Time:- 2PM to 5PM

Date:30/11/2014

Instructions:

MIS No.

--	--	--	--	--	--	--	--	--	--

1. All questions are compulsory.
2. Figures to the right indicate the full marks.
3. Mobile phones and programmable calculators are strictly prohibited.
4. Writing anything on question paper is not allowed.
5. Exchange/Sharing of anything like stationery, calculator is not allowed.
6. Assume suitable data if necessary.
7. Write your MIS Number on Question Paper

- Q 1 A) Explain special importance of modeling techniques in geotechnical engineering. (03)
- B) Explain principal purposes of geotechnical modeling. (04)
- C) What is numerical modeling in geotechnical engineering (03)
- D) Write a brief note on centrifuge modeling in geotechnical engineering. (02)

- Q 2 A) Following table shows details of core pieces received during one single full drilling run of "NX Type" core drilling operation.

Piece No	1	2	3	4	5	6	7	8	9
Length (cm)	3	5	12	35	45	25	11	8	4

- Joint between piece no. 8 and 9 is found to be fresh. Compute CR and RQD. (02)
- B) Write a detailed note on "Rock Mass Rating". (04)
- C) List various laboratory and field tests performed on rock. (02)
- Describe in detail the following lab tests. (04)
- i) Point load test
 - ii) Brazilian test
- Q 3 A) A 6m high cut of a highway has a slope angle of 20° . The soil is homogeneous with $\gamma_{\text{sat}} = 18.5 \text{ kN/m}^3$, $c_u = 40 \text{ kPa}$ and $\phi' = 29^\circ$. The ground water table is intercepted at the level of toe of the slope. Assume centre of rotation located at 3m towards slope side at the level of crest of the slope such that the circular slip surface passes through

the toe of the slope. Compute the factor of safety of the slope using simplified Bishop's Method. (Hint: Use graph paper for drawing the given slope) (08)

B) Explain with illustration needs of "ESA" and "TSA" in a slope stability problems. (04)

Q 4 A) Design a 5m high geotextile reinforced soil retaining wall. The reinforced coarse grained soil have $\gamma_{\text{sat}} = 17 \text{ kN/m}^3$ and $\phi' = 28^\circ$. Retaining wall carries a surcharge of 18 kPa. The selected geotextile have wide width ultimate tensile strength of 75 kN/m and the soil-geotextile interface friction value is 18° . The foundation soil is a clay with $\gamma_{\text{sat}} = 18.5 \text{ kN/m}^3$, $c_u = 60 \text{ kPa}$ and $\phi' = 28^\circ$. Assume suitable values of factor of safeties. (06)

Draw well labeled sketch of the above designed wall. (02)

B) Write a detailed note on "Gabian Wall" (04)

Q 5 A) Write a detailed note on "Flexible Retaining Wall". (04)

B) Consolidated undrained (CU) triaxial tests conducted on specimens of a saturated clay soil gave the following results:

Cell Pressure (kN/sq.m)	Deviator stress at failure (kN/sq.m)	Pore water pressure at failure (kN/sq.m)
150	102	80
300	200	164
450	304	246
600	405	325

Determine the effective stress strength parameters by the Mohr circle method and the stress point method. (08)
(Hint: Use graph paper)

***** END OF PAPER *****