Academic Calendar of VTU, Belagavi for ODD Semester of 2019-2020 (Jul 2019 – Jan 2020)

	I Sem B. E. / B. Tech. / B. Arch. (Tentative)	III, V & VII Sem B. E. /B. Tech. III, V,VII & IX Sem B. Arch.	III & V Sem MCA	III Sem MBA	III Sem M. Tech.	III Sem M. Arch.
Commencement of ODD Semester	01.08.2019	29.07.2019	29.07.2019	08.08.2019	26.08.2019	08.09.2019
Last Working day of ODD Semester	29.11.2019	30.11.2019	30.11.2019	05.12.2019	23.12.2019	06.01.2020
Practical Examinations	03.12.2019 To 13.12.2019	03.12.2019 To 13.12.2019	03.12.2019 To 07.12.2019	-	-	-
Theory Examinations	16.12.2019 To 04.01.2020	16.12.2019 To 07.02.2020	09.12.2019 To 28.12.2019	09.12.2019 To 04.01.2020	27.12.2019 To 10.01.2020	08.01.2020 To 22.01.2020
Internship Viva-Voce	-	-	-	-	12.01.2020 To 19.01.2020	-
Professional training / Organization study	-	-	-	-	-	-
Commencement of EVEN Semester	27.01.2020	10.02.2020	27.01.2020	27.01.2020	27.01.2020	01.02.2020

NOTE

- **VII Semester B. E / B. Tech** students shall have to undergo **Internship** for a period of four Weeks.
- **I Semester B. E/ B. Tech / B. Arch** Students shall compulsorily undergo **Induction Program** for a period of 3 Weeks (two phases) as per the schedule given by VTU. First phase 11 days in first semester and second phase 10 days in second semester.

1. **College Time Table shall be arranged for five and a half week days and planned to accommodate EDUSAT transmission slots, the schedule of which will be notified separately.**
2. **The faculty/staff shall be available to undertake any work assigned by the university.**
3. **If any of the above date is declared to be a holiday then the corresponding event will come into effect on the next working day.**
4. **Notification regarding Calendar of Events relating to the conduct of University Examination will be issued by the Registrar (Evaluation) from time to time.**

28/6/19

REGISTRAR

Academic Calendar of VTU, Belagavi for B. E. I Semester of 2019-2020 (Jul 2019 – Jan 2020)

	I Sem B. E. / B. Tech. / B. Arch.
Commencement of ODD Semester	09.08.2019
Last Working day of ODD Semester	21.12.2019 (Includes 11 days induction programme)
Practical Examinations	23.12.2019 To 03.01.2020
Theory Examinations	06.01.2020 To 28.01.2020
Internship Viva-Voce	-
Professional training / Organization study	-
Commencement of EVEN Semester	10.02.2020

NOTE

- **I Semester B. E/ B. Tech / B. Arch** Students shall compulsorily undergo **Induction Program** for a period of 3 Weeks (two phases) as per the schedule given by VTU. **First phase 11 days** in the beginning of first semester and **second phase 10 days** in the beginning of second semester.

1. **College Time Table shall be arranged for five and a half week days and planned to accommodate EDUSAT transmission slots, the schedule of which will be notified separately.**
2. **The faculty/staff shall be available to undertake any work assigned by the university.**
3. **If any of the above date is declared to be a holiday then the corresponding event will come into effect on the next working day.**
4. **Notification regarding Calendar of Events relating to the conduct of University Examination will be issued by the Registrar (Evaluation) from time to time.**

30.7.2019

REGISTRAR

Bapuji Institute of Engineering and Technology, Davanagere -577004

CALENDER OF EVENTS-ODD SEMESTER: JULY 2019 –JAN 2020

PARTICULARS	I sem BE/B Tech	III , V , VII sem BE/B.Tech	III & V sem MCA	III sem MBA	III sem M.Tech
Commencement of ODD sem	09-08-2019	29-07-2019	29-07-2019	08-08-2019	26-08-2019
Last Working Day	21-12-2020	30-11-2019	30-11-2019	05-12-2019	23-12-2019
1st IA Test Series	23-09-2019 30-09-2019	11-09-2019 17-09-2019	11-09-2019 17-09-2019	19-09-2019 25-09-2019	-----
2nd IA Test Series	04-11-2019 09-11-2019	14-10-2019 19-10-2019	14-10-2019 19-10-2019	21-10-2019 26-10-2019	-----
3rd IA Test Series	13-12-2019 19-12-2019	21-11-2019 27-11-2019	21-11-2019 27-11-2019	27-11-2019 03-12-2019	-----
Practical Examination	23-12-2019 03-01-2020	03-12-2019 13-12-2019	03-12-2019 07-12-2019	-----	-----
Theory Examination	06-01-2020 28-01-2020	16-12-2019 07-02-2020	09-12-2019 28-12-2019	09-12-2019 04-01-2020	27-12-2019 10-01-2020
Internship Viva-Voce/ Summer Project/ Professional training	-------	-------	-------		12-01-2020 19-01-2020
Commencement of even sem	10-02-2020	10-02-2020	27-01-2020	27-01-2020	27-01-2020

DEPARTMENT	EVENT	TENTATIVE DATE
Chemical Engineering	Inauguration of ACES	24-08-2019
	Alumni meet	31-08-2019
	Guest lecture-1	07-09-2019
	Industrial Visit	27-09-2019
	Guest lecture-2	22-10-2019
Electronics & communication	Orientation day	17-08- 2019
	EC Forum Inauguration	05-09-2019
	Lecture series	16-09-2019 to 21-09-2019
Basic Science	1st Sem Induction programme	1 to 10 August 2019

DEPARTMENT	EVENT	TENTATIVE DATE
Mechanical Engg.	Royal Mech forum inauguration	05-09-2019
	Technical Talk-I	11-10-2019
	Technical Talk-I	16-11-2019
Biotechnology	Biolit forum activity-I	07 to 21 Aug 2019
	Biolit Forum Activity Inauguration	17-08-2019
	Biolit forum activity-II	18-09-2019
	Biolit forum activity-III	30-10-2019
	Biolit forum activity-IV	11-11-2019

HoDs are informed to:

1. Submit list of open and professional electives offered along with students registered, on or before 10-8-2019.
2. Arrange parents meet after the 1st test series and send the proceedings to the Principals Office.

HOD

Dean Academic 31.7.2019

M. C. Manage

Principal

VISION OF THE DEPARTMENT

To train the students to become Civil Engineers with leadership qualities, having ability to take up professional assignments and research with a focus on innovative approaches to cater to the needs of the society.

MISSION OF THE DEPARTMENT

1. To provide quality education through updated curriculum and conducive teaching learning environment for the students to excel in higher studies, competitive examinations and professional career.
2. To impart soft skills, leadership qualities and professional ethics among the graduates to handle the projects independently with confidence.
3. To deal with the contemporary issues and to cater to the socio-economic needs.
4. To build industry-institute interaction and to establish good rapport with alumni.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Core Competence: Graduates will be able to plan, analyse, design and construct sustainable Civil Engineering Infrastructure.

PEO 2: Professional Skills: Graduates will be professional engineers with a sense of ethics, creativity, leadership, self-confidence and independent thinking to cater to the needs of the society.

PEO 3: Societal Needs: Graduates will be able to contribute effectively for the development of industry and professional bodies.

PEO 4: Cognitive Intelligence: Graduates will be able to take up competitive examinations, higher studies and involve in research and entrepreneurship activities.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Students after the completion of the Program will be able to

1. Apply the fundamental concepts, software and codal provisions in the analysis, design and construction of sustainable civil engineering infrastructure.
2. Inculcate professional and leadership qualities, sense of ethics and confidence related to civil engineering.

Faculty will be able to

3. Contribute to the overall development of civil engineering community through the professional bodies and offer services to the society.

Vision of BIET

To be a center of excellence recognized nationally and internationally, in distinctive areas of engineering education and research, based on a culture of innovation and invention.

Mission of BIET

BIET contributes to the growth and development of its students by imparting a broad based engineering education and empowering them to be successful in their chosen field by inculcating in them positive approach, leadership qualities and ethical values

Title & Code	Applied Geotechnical Engineering (17CV53)
CO	Statement
17CV53.1	**Plan** and **execute** geotechnical site investigation program for civil engineering projects
17CV53.2	**Plot** stress distribution and resulting settlement beneath the loaded footings on sandy and clayey soils
17CV53.3	**Compute** the lateral earth pressure behind earth retaining structures
17CV53.4	**Estimate** the factor of safety against failure of slopes
17CV53.5	**Determine** the bearing capacity of soil and proportion the shallow isolated and combined footings for uniform bearing pressure
17CV53.6	**Determine** the load carrying capacity of single pile and group of piles

Course Title		Applied Geotechnical Engineering										
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
17CV53.1	2	2	1	1		1		1				2
17CV53.2	2	2	1	1		1		1				2
17CV53.3	2	2	1	1		1		1				2
17CV53.4	2	2	1	1		1		1				2
17CV53.5	2	2	1	1		1		1				2
17CV53.6	2	2	1	1		1		1				2
Average	2	2	1	1		1		1				2

CO	PSO1	PSO2
17CV53.1	2	2
17CV53.2	2	2
17CV53.3	2	2
17CV53.4	2	2
17CV53.5	2	2
17CV53.6	2	2
Average	2	2

BEA, BIET, Civil Engineering Department.ODD Sem: July-Dec 2019 Timetable

NAME: [redacted] SHANKRAMMA . S.HALAVAR

SUB I: 17CV53, Applied Geotechinical Engineering (A -SEC) : Room no. CV 105

SUBII: 17CV53, Applied Geotechinical Engineering (B -SEC) : Room no. CV 101

LAB I: 17CVL57,Geotechnical Engineering Laboratory(A2,A3,B1&B2)

Hours→ Day↓	08.00 AM-09.00 AM	09.00 AM-10.00 AM	LEISURE	10.30 AM-11.30 AM	11.30 AM-12.30 PM	LUNCH BREAK	02.00 PM-03.00 PM	03.00 PM-04.00 PM	04.00 PM-05.00 PM
MON		17CV53(B)		17CV53(A)			17CVL57-A2 NF1 & NF2		
TUE				17CV53(A)			17CVL57-A3 NF1&CGS		
WED		17CV53(B)					17CVL57-B2 NF1&NF2		
THU		17CV53(A)							
FRI	17CV53(B)						17CVL57-B1 NF1& Prof.SS		
SAT	17CV53(A)			17CV53(B)					

TIME TABLE INCHARGE

HOD

M C Murugaja

PRINCIPAL

cohesionless and cohesive soils by static formula, efficiency of file group, group capacity of piles in cohesionless and cohesive soils, negative skin friction, pile load tests, Settlement of piles, under reamed piles (only introductory concepts – no derivation)

L1, L2, L3 L4

Course outcomes: On the completion of this course students are expected to attain the following outcomes;

1. Ability to plan and execute geotechnical site investigation program for different civil engineering projects
2. Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
3. Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
4. Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
5. Capable of estimating load carrying capacity of single and group of piles

Text Books:

1. Gopal Ranjan and Rao A.S.R., Basic and Applied Soil Mechanics, New Age International (P) Ltd., New Delhi.
2. Punmia B C, Soil Mechanics and Foundation Engineering, Laxmi Publications co., New Delhi.
3. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering, UBS Publishers and Distributors, New Delhi.
4. Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India

Reference Books:

1. T.W. Lambe and R.V. Whitman, Soil Mechanics-, John Wiley & Sons
2. Donald P Coduto, Geotechnical Engineering- Phi Learning Private Limited, New Delhi
3. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-. , Tata McGraw Hill Publications
4. Debashis Moitra, "Geotechnical Engineering", Universities Press.,
5. Malcolm D Bolton, "A Guide to soil mechanics", Universities Press.,
6. Bowles J E , Foundation analysis and design, McGraw- Hill Publications

LESSON PLAN

Subject : Applied Geotechnical Engineering Subject Code : 17CV53 Class : Vth Sem A and B

Period	Date	Topics Planned	Date	Topics Covered	Remarks
1	29/07/2019	module-01 Introduction, objectives and importance	09/08/2019	MODULE-01 Introduction objectives and importance	
2	31/07/2019	Stages and methods of exploration	10/08/2019	Stages and methods of exploration	
3	01/08/2019	Test pits Borings	14/08/2019	Test pits, Borings	
4	03/08/2019	Geophysical methods Stabilization of boreholes	16/08/2019	Geophysical methods Stabilization of boreholes	
5	05/08/2019	Sampling techniques problems	17/08/2019	Sampling techniques problems	
6	07/08/2019	undisturbed, disturbed and representative samples	19/08/2019	undisturbed, disturbed and representative samples	
7	08/08/2019	Geophysical exploration	21/08/2019	Geophysical exploration	
8	10/08/2019	Borehole log	23/08/2019	Borehole log	
9	14/08/2019	Drainage and dewatering methods	24/08/2019	drainage and dewatering methods	
10	17/08/19	estimation of depth of water [Hvorslev's method]	26/08/2019	estimation of depth of water [Hvorslev's method]	
11	19/08/2019	MODULE-02 Introduction Boussinesq's and westergaards theory	28/08/2019	MODULE-02 Introduction Boussinesq's and westergaards theory	
12	21/08/2019	Concentrated load, circular load	29/08/2019	Concentrated load, circular load	
13	22/08/2019	rectangular load, equivalent point load method	31/08/2019	Rectangular load, equivalent point load method	
14	24/08/2019	pressure distribution diagram, contact pressure	04/09/2019	Pressure distribution diagram, contact pressure	
15	26/08/2019	New mark's chart.	05/09/2019	New mark's chart	
16	28/08/2019	Foundation Settlement	07/09/2019	Foundation Settlement	
17	30/08/2019	approximate method	09/09/2019	approximate method	

LESSON PLAN

Subject : Applied Geotechnical Engineering Subject Code : 17CV53 Class : Vth A and B

Period	Date	Topics Planned	Date	Topics Covered	Remarks
18	31/08/2019	types of settlement and importance	14/09/2019	types of settlement and importance	
19	04/09/2019	computation of immediate settlement	16/09/2019	computation of immediate settlement	
20	05/09/2019	and consolidation settlement.	18/09/2019	and consolidation settlement	
21	07/09/2019	MODULE-03, active, passive and earth pressure at rest.	16/11/2019	MODULE-03 active passive and earth pressure at rest	
22	09/09/2019	Rankine's theory for cohesionless soils	16/11/2019	Rankine's theory for cohesionless soils	
23	11/09/2019	and cohesive soils	18/11/2019	and cohesive soils	
24	12/09/2019	Coulomb's theory	20/11/2019	Coulomb's theory	
25	14/09/2019	Rebhann's and Culmann's graphical construction	20/11/2019	Rebhann's and Culmann's graphical construction	
26	16/09/2019	assumptions, infinite and finite slopes	21/11/2019	assumptions, infinite and finite slopes	
27	18/09/2019	factor of safety	22/11/2019	factor of safety	
28	19/09/2019	use of Taylor's stability charts	23/11/2019	use of Taylor's stability charts	
29	21/09/2019	Swedish slip circle method for C and C-Φ [methods of slices]	23/11/2019	Swedish slip circle method for C and C-Φ [methods of slices]	
30	23/09/2019	Fellineous method for critical slip circle (Cohesive soils)	28/11/2019	Fellineous method for critical slip circle (Cohesive soils)	
31	25/09/2019	MODULE-04 types of foundations	19/09/2019	MODULE-04 type of foundations	
32	26/09/2019	determination of bearing capacity by Terzaghi's	21/09/2019	determination of bearing capacity by Terzaghi's	
33	28/09/2019	BIS methods	23/09/2019	BIS methods	
		effect of water		effect of water	

LESSON PLAN

Subject : Applied Geotechnical Engineering Subject Code : 17CV53 Class : IVth Sem A and B

Period	Date	Topics Planned	Date	Topics Covered	Remarks
35	03/10/2019	Eccentricity	26/09/2019	Eccentricity	
36	05/10/2019	Field methods plate load test	30/09/2019	Field methods plate load test	
37	09/10/2019	SPT [Standard Penetration test]	10/10/2019	SPT [Standard penetration test]	
38	10/10/2019	proportioning of Shallow foundations	12/10/2019	proportioning of Shallow foundations	
39	12/10/2019	Isolated footing	14/10/2019	Isolated footing	
40	14/10/2019	combined footings [only two columns]	16/10/2019	combined footings [only two columns]	
41	16/10/2019	MODULE-05 type and classification of piles	17/10/2019	MODULE-05 type and classification of piles	
42	17/10/2019	Single loaded pile capacity in cohesion -less	18/10/2019	Single loaded pile capacity in cohesion -less	
43	19/10/2019	and cohesive soils by static formula	19/10/2019	and cohesive soils by static formula	
44	21/10/2019	efficiency of pile group	25/10/2019	efficiency of pile group	
45	23/10/2019	group capacity of piles in cohesion -less	30/10/2019	group capacity of piles in cohesion	
46	24/10/2019	and cohesive soils	31/10/2019	and cohesive soils	
47	26/10/2019	negative skin friction	1/11/2019	negative skin friction	
48	30/10/2019	pile load tests	13/11/2019	pile load tests	
49	31/10/2019	settlement of piles	14/11/2019	settlement of piles	
50	02/11/2019	Underreamed piles [only introductory concepts no-derivation]	14/11/2019	Underream of piles [only introductory concepts no-derivation]	

LESSON PLAN

Period	Date	Topics Planned	Date	Topics Covered	Remarks

Text Books :

1. Gopal Ranjan and Rao A.S.R. Basic and applied soil mechanics, Gupta B.C. Soil mechanics and foundation Engg
2. Murthy V.N.S. Principles of Soil mechanics and foundation Engineering, Braja. M. Das Geotechnical Engineering

Reference Books :

1. T.W. Lambe and R.V. Whitman. Soil mechanics-Johnwiley and sons
2. Donald P coduto. Geotechnical engineering. PHI learning Private limited. New Delhi
3. Shashi K Gulhati and Manoj Datta. Geotechnical Engineering
4. Debashis Maitra. Geotechnical Engineering
5. Malcolm D Bolton. A guide to soil mechanics
6. Bowles J.E. foundation analysis and design

INSTRUCTIONS

1. This register is for attendance and assessment record of class work to be maintained by every faculty member handling classes.
2. This record is an important document and the faculty members should make the entries in the relevant columns and keep the same upto date and correct.
3. Attendance must be marked on a cumulative basis.
4. At the end of each period, the total number of absentees should be clearly noted at the bottom of each column on each page as a check.
5. The names of students who absent themselves continuously to the classes may be brought to the notice of the HOD by the concerned staff.
6. The register should be handed over to the HOD whenever the teacher goes on long leave/at the end of semester/leaving the institution with all details filled up.
7. At the end of the semester, the cumulative attendance should be worked out, entered in the relevant column for each student and the register should be submitted to the HOD.
8. Staff shall get this record reviewed by the HOD on a monthly basis.

Period : From JULY 2019 To DEC - 2019 Semester : Odd/Even ✓

Name of the Teacher : Shankramma. H. Halavar

Designation : Assistant Professor

Department : B.E Civil Engineering

Sl. No.	Sem. / Sec. / Branch	Subject Name	Subject Code
1	5th A. Civil Engineering	Applied Erechechnical Engineering	17CV53
2	5th B Civil Engineering	Applied Erechechnical Engineering	17CV53
3	5th A2, A3	Applied Erechechnical laboratory	17CVL57
4	5th B1, B2	Applied Erechechnical laboratory	17CVL57
5			
6			
7			

	Reviews at the end of the				End of Semester
	1st Month	2nd Month	3rd Month	4th Month	
Signature of Staff					
Signature of the Head of Department					
Signature of the					

Class : V th A | Subject Code : 17CVS3 | Subject : Applied Environmental Engineering | Total No. of Classes : 57

Sl No.	USN	NAME	DATE	08/08/19	10/08/19	13/08/19	17/08/19	19/08/19	20/08/19	22/08/19	24/08/19	27/08/19	29/08/19	30/08/19	31/08/19	03/09/19	05/09/19	06/09/19	07/09/19	09/09/19	10/09/19	19/09/19	20/09/19	24/09/19	25/09/19	26/09/19	27/09/19	01/10/19	03/10/19	04/10/19	10/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	Average (Conversion to 20)	To be Remarks
1	UBD14CV077	Prabhudeva N T		1	2		3	4		5	6	7	8		9		10	11		12	13	14		15	16	17		18	19	20			9.5	7.5	11.5	10+5	15
2	UBD14CV129	Siddesh B.O		1	2	3	4	A	A	5	6	7	8	9	10	A	11	12	13	14	A	15	16	17	18	19	A	20	A	21			02	10.5	09	10+5	15
3	UBD15CV049	karthik M.V															design																			
4	UBD16CV007	AJAY P H		1	2	A	3	4	5	6	7	A	8	9	A	10	11	12	13	14	A	15	16	A	17	18	A	19	20	21			22	20	30	24+10	34
5	UBD16CV019	Arpitha R		1	2	3	4	5		6	7	8	9		10	11	12	13	14	15			16	17		18		19	20	21			22	26	17	02+10	32
6	UBD16CV041	karthik S H		1	2	3	A	4	5	6	7	8	9	10	11	A	12	13	14	15	16	17	A	A	A	A	18	19	20	21			14.5	14.5	7.5	15+05	28
7	UBD16CV051	Manu H B															design																			
8	UBD16CV059	Manjanagowda		1	2	3	4	5	A	A	A	A	6	7	8	A	A	9	10	11	12	13	14	15	16	17	A	18	19	20			26	10	17	11+10	21
9	UBD16CV062	Nikhitha S.S		A	1	2	3	4	5	A	6	7	A	8	9	10	11	12	13	14	15	A	16	A	17	18	A	19	A	20			11.5	7.5	Ab	10+05	15
10	UBD16CV065	Niveditha		1	2	3	4	5	6	7	8	A	A	9	10	A	11	12	A	13	14	15	A	16	17	18	19	20	A	21			30	28	26	28+10	38
11	UBD16CV083	Renuka prasad		1	A	A	2	3	A	A	4	5	6	7	8	A	9	10	11	12	13	14	A	A	15	A	16	17	A	18			09	10	18	16+10	26
12	UBD16CV087	Sandeep B.R		1	2	A	3	A	A	4	5	6	7	8	A	9	10	A	A	11	12	A	13	A	14	A	15	16	17	18			19	10	17	16+10	26
13	UBD16CV089	Sanjay A.B		1			2	3		4	5	6	7		8	9	10	11		12	13		14	15	16		17	18	19	20			27	06	27.5	11+10	21
14	UBD16CV093	Shameer.		1	2			3	4	5	6	7	8	9	10	11			12	13	14	15	16	17	18	19	20			21			17	12	18	16+10	26
15	UBD16CV099	Shoaib ahamed															design																			
16	UBD16CV122	Yashas H.V		1	A	2	3	4	5	6	7	8	A	9	10	11	A	12	13	14	15	16	17	18	19	20	21	22	A	23			13.5	9.5	9.5	10+05	15
17	UBD16CV115	vahini V.		A	1	2	3	4	5	A	A	6	7	8	9	A	10	11	A	12	13	A	14	15	A	16	A	17	A	18			11.5	11.5	Ab	12+05	17
18	UBD17CV001	ABHISHEK R.V.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	A	22	23	24	A	25			30	30	30	30+10	40
19	UBD17CV003	Akash		1	2	3	4	5	6	A	7	8	9	10	A	11	12	13	14	15	16	17	A	18	A	19	A	20	21	22			30	30	30	30+10	40
20	UBD17CV005	AKshitha M		1	A	2	3	4	5	6	7	8	9	10	A	A	11	12	13	14	A	15	A	16	A	17	A	18	19	20			26	27	23	26+10	36
21	UBD17CV007	Anjan kumar TC		1	2	3	4	5	6	A	7	8	9	10	11	12	13	A	A	14	15	16	A	17	18	19	A	20	A	21			29	29.5	30	30+10	40
22	UBD17CV009	Anusha nyamati		1	2	3	4	5	6	7	8	9	10	11	12	A	13	14	15	16	17	18	19	20	21	22	A	23	A	A			30	28	27	29+10	39
23	UBD17CV011	Arunkumar malager		A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26			30	26	28	28+10	38
24	UBD17CV013	B Shravan Reddy		1	2	3	A	A	4	5	A	6	A	7	A	8	9	10	11	12	A	A	13	14	A	15	A	16	A	17			13	20	10	15+10	25
25	UBD17CV015	Bharath kumar H		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	A	26			30	29	29	30+10	40
26	UBD17CV017	BHOOMIKA S.P		1	2	3	4	5	6	7	8	9	10	11	12	A	A	14	15	16	A	A	17	18	19	20	21	22	A	23			30	30	30	30+10	40
27	UBD17CV019	Chandana R.G		1	2	3	4	5	6	7	8	9	10	11	12	A	13	14	15	16	17	A	18	19	20	21	22	23	A	24			30	30	30	30+10	40
28	UBD17CV023	Darshane patil CP.		1	2	3	4	5	6	7	A	8	9	10	11	A	12	13	14	15	16	17	A	18	A	A	19	A	20	A			03	08	22	11+10	21
29	UBD17CV029	Divya Sharma		1	2	3	A	4	5	6	7	A	8	9	A	10	11	12	A	A	13	14	A	A	15	16	A	17	A	18			27	15	22	22+10	32
30	UBD17CV031	Gouthamraj M.R		1	2	3	4	5	6	A	7	8	A	9	10	A	11	12	13	14	15	16	17	A	18	A	A	19	20	21			28	29	30	30+10	40
		Initials of Teacher																																		
		Initials of H.O.D																																		

Class : V TH A | Subject Code : 17CVS3 | Subject : Applied Geotechnical Engineering | Total No. of Classes : 37

Sl No.	USN	NAME	DATE	08/08/19	10/08/19	13/08/19	17/08/19	19/08/19	20/08/19	22/08/19	24/08/19	27/08/19	29/08/19	30/08/19	31/08/19	03/09/19	05/09/19	06/09/19	07/09/19	07/09/19	19/09/19	20/09/19	24/09/19	25/09/19	26/09/19	27/09/19	01/10/19	03/10/19	04/10/19	10/10/19	11/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	CIE Average	Test Remarks
31	1BD17CV033	Hemanth S.M																																		
32	1BD17CV035	Gautam S Vatha	1	2	3	4	5	6	7	8	9	A	10	11	A	12	13	14	15	A	16	17	A	18	A	19	20	A	21	22			23	14	28	22+10	32
33	1BD17CV037	Jayashree. K.R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	A	25	26			21	21	12	18+10	28
34	1BD17CV039	Kavya J.L	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25	26	27			29	28	28	29+10	39
35	1BD17CV041	Kiran R. Apakeri	1	2	3	A	4	5	6	7	8	A	9	A	A	10	11	12	13	14	15	A	A	16	17	18	A	19	A	20			29	28	23	27+10	37
36	1BD17CV043	Mahesh B.K	1		2	3	4		5	6			7	8	9			10	11	12		13		14	15		16		17	18			13	14	10	13+10	23
37	1BD17CV045	Mallik Rajan B K	1		2			3	4		5	6	7	8		9	10	11	12			13	14		15		16	17	18	19			08	15	14	12+10	22
38	1BD17CV047	Mallikarjuna. B.D	1		2		3		4	5	6	7		8		9	10		11	12	13	14		15	16			17	18	19			15	15	19	17+10	27
39	1BD17CV049	Manjunath. P. Naik	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			30	30	30	30+10	40
40	1BD17CV051	Mohamed AAQIb	1	2	3	4	5		6	A	7	8	9	10	A	11	12	13	14	15	16	A	17	18	19	A	20	A	21	22			30	28	27	29+10	39
41	1BD17CV053	Mohammed Thoufiq S	1	2	A	3	4	5	6	7		8	9	A	10	A	12	13	14	15	16	A	A	17	18	A	19	A	20	21			21	14	20	19+10	29
42	1BD17CV057	Nandeesh N.N																															10	06	22	13+10	23
43	1BD17CV061	Nisha. R																		Detain																	
44	1BD17CV067	Piyush Raman	1	2	3	4	5	6	7	8	A	9	10	11	12	A	13	14	15	16	17	18	19	20	A	21	A	22	23	24			30	28	28	29+10	39
45	1BD17CV069	Prathm R Dafedar	1	2	A	3	4	A	5	6	7	A	8	9	A	10	11	12	13	A	A	14	15	16	A	17	A	18	19	20			27	21	24	24+10	34
46	1BD17CV070	Rachana K.S	1	2	3	A	4	5	6	A	7	8	A	A	9	10	A	A	11	A	12	A	A	13	14	15	A	16	17	18			17	14	27	20+10	30
47	1BD17CV071	Rahul Alur	1	2	3	4	5	6	7	8	9	A	10	A	11	12	A	13	14	A	A	15	16	A	17	18	A	19	20	A			22	21	19	21+10	31
48	1BD17CV075	Rakshitha A.	1	2	3	4	A	5	6	7	8	9	A	10	A	11	12	13	14	15	A	16	A	17	18	19	A	20	21	22			12	15	30	19+10	29
49	1BD17CV077	Rakshitha P. R	1	2	A	3	4	5	6	7	8	9	10	11	A	12	13	14	15	16	17	18	19	A	20	21	22	A	23	24			28	23	30	27+10	37
50	1BD17CV079	Rishika. R Radekoppa	1	2	3	4	5	6	7	8	9	10	11	12	A	13	14	15	16	17	A	18	A	A	19	20	A	21	22	23			30	23	28	27+10	37
51	1BD17CV085	Salma O	1	2	3	4	5	6	A	7	8	9	A	10	11	12	13	14	15	A	16	17	A	18	19	20	21	A	22	23			29	26	25	27+10	37
52	1BD17CV089	Samay S H			1	2		3	4	5		6	7		8		9	10	11	12	13	14		15		16	17	18	19			09	10	29	16+10	26
53	1BD17CV093	Shodhana D.N	1	2	3	4	5	6	A	7	8	9	10	A	11	12	13	A	14	15	16	A	17	18	19	20	21	A	22	23			30	29	30	30+10	40
54	1BD17CV095	Shreyas. V.V																		Detain																	
55	1BD17CV097	Soumya N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	A	21	22	23	24	25	26	27			30	29	30	30+10	40
56	1BD17CV099	Suhas. S	1			2		3	4	5	6	7	8		9	10	11			12	13		14		15	16	17	18	19	20			02	08	30	14+10	24
57	1BD17CV0101	Suma R olekar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	A	26	27			30	29	30	28+10	38
58	1BD17CV103	Syed Umar Parvaq	1	2	3	4	5	6	A	7	A	8	9	10	A	11	12	13	14	15	16	17	A	18	19	20	21	A	22	A			20	20	20	20+10	30
59	1BD17CV109	Varshitha. B.R	A	1	2	3	4	5	A	6	7	8	9	A	10	11	12	13	14	15	16	17	18	19	A	20	A	21	22	A			19	20	28	23+10	33
60	1BD17CV111	Veeresh. T.M	1	A	2	3	A	4	5	6	A	7	8	9	A	10	11	12	13	14	15	16	17	A	18	19	20	A	21	22			17	22	25	22+10	32
		Initials of Teacher																																		
		Initials of H.O.D																																		

Class : V th A | Subject Code : 17CV53 | Subject : Applied environmental engineering | Total No. of Classes : 50

Sl No.	USN	NAME	DATE	08/08/19	10/08/19	13/08/19	17/08/19	19/08/19	20/08/19	22/08/19	24/08/19	27/08/19	29/08/19	30/08/19
61	4BD17CV115	Vinayaka M. Belavagi		1	2	3	4	5	6	7	8	9	10	11
62	4BD17CV117	Vismaya. A.T.		1	2	3	4	5	6	7	8	9	10	11
63	4BD17CV119	Sachin D.S		1	2	3	4	5	6	A	7	A	8	9
64	4BD17CV121	Ankith Raj R.V		1	2	3	4	5	6	A	7	A	8	9
65	4BD18CV403	Chethan S		A	1	2	3	4	5	A	A	6	7	8
66	4BD18CV405	Ganesh K.V		1	2	3	4	5	6	A	7	A	8	9
67	4BD18CV408	Harsha H.K		1	2	3	4	5	6	A	7	8	9	10
68	4BD18CV409	Jothiram B.N		1	2	3	4	5	A	6	7	8	9	10
69	4BD18CV413	Lohith kumar B		1	2	3	4	5	6	A	7	8	A	9
70	4BD18CV417	Nayanashree M		1	A	2	3	4	A	5	6	7	8	A
71	4BD18CV419	Praveen kumar M												
72	4BD18CV420	Prem V		1	2	3	4	5	6	7	8	9	10	11
73	4BD18CV421	Rakshitha K		1	2	3	4	5	6	7	8	9	10	11
74	4BD18CV423	Sachin K.V		1	2	3	4	5	6	7	8	9	10	11
75	4BD18CV427	Shruthi R.M		1	2	3	4	5	6	7	8	9	10	11
76	4BD18CV428	Soumya K.R		1	2	3	A	4	A	5	6	7	8	9
77	4BD18CV429	Varun Sagar R		1	A	A	2	A	A	A	A	3	4	5
78	4BD18CV430	Vinutha R		1	2	3	A	4	A	A	5	6	7	8
79	4BD18CV431	Yashwanth Rathodavs		1		2	3	4		5	6	7	8	9
80	4BD18CV432	Yathoosha R.N.		1	2	3	4	5	6	7	A	A	8	9
81	4BD18CV053	Megha M												
82	4BD15CV113	Theras R		A	1	A	2	A	3	A	4	5	6	7
			Initials of Teacher											
			Initials of H.O.D											

31/08/19	03/09/19	05/09/19	06/09/19	07/09/19	09/09/19	19/09/19	20/09/19	24/09/19	25/09/19	26/09/19	27/09/19	01/10/19	03/10/19	04/10/19	10/10/19	11/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	Average	Total Remarks
12	13	14	15	16	17	18	19	20	21	22	A	23	24	25	26	27			28	29	29	29+10	39
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			30	23	30	28+10	38
10	A	11	12	13	14	15	A	A	16	17	18	A	19	A	20	21			22	21	20	21+10	31
10	A	11	12	13	14	15	16	17	18	A	19	20	21	A	22	23			28	22	21	24+10	34
9	10	11	12	13	14	15	A	16	17	18	19	A	20	A	21	22			22	20	10	18+10	28
A	10	11	12	13	14	15	16	17	18	19	20	A	21	A	22	23			27	26	15	23+10	33
11	12	13	14	15	16	17	18	19	20	21	A	22	A	23	24	A			18	23	19	20+10	30
11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25	26			30	27	28	29+10	39
10	11	12	13	A	14	15	16	17	A	A	18	19	A	A	20	21			22	20	26	23+10	33
9	10	11	12	13	14	15	16	A	17	18	19	20	21	22	23	24			22	22	26	24+10	34
				Detain																			
12	13	14	15	16	17	18	19	20	21	22	23	24	25	A	26	27			19	28	22	23+10	33
12	13	A	A	14	15	A	A	16	17	18	19	20	21	22	23	24			27	20	24	24+10	34
A	A	A	12	13	14	15	16	17	18	19	20	21	22	23	A	A			19	09	15	15+10	25
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			25	28	23	26+10	36
A	A	10	11	12	13	14	A	15	16	17	18	19	A	A	20	A			23	14	22	20+10	30
6	7	8	9	10	11	12	13	14	15	16	17	18	19	A	20	21			09	15	15	13+10	23
9	10	11	12	13	14	15	A	16	17	18	19	20	21	A	22	23			18	15	14	16+10	26
10		11	12		13	14	15	16		17	18		19	20	21	22			04	18	20	14+10	24
A	A	10	11	12	13	14	A	A	15	16	17	18	19	20	21	22			02	18	17.5	13+10	23
		Detain																					
8	9	10	11	12	13	14	15	16	17	18	19	A	20	21	22	23			2.5	9.5	9.5	10+10	15

Class : V Th B | Subject Code : 17CV53 | Subject : Applied Geotechnical Engineering | Total No. of Classes : 50

Sl No.	USN	NAME	DATE	09/08/19	10/08/19	14/08/19	16/08/19	17/08/19	19/08/19	21/08/19	23/08/19	24/08/19	26/08/19	28/08/19	29/08/19	31/08/19	04/09/19	05/09/19	07/09/19	09/09/19	14/09/19	16/09/19	18/09/19	19/09/19	21/09/19	23/09/19	25/09/19	26/09/19	30/09/19	10/10/19	12/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	CIE Average + Quiz	Scaled Remarks
1	1BD15CV022	Artharva M.R																																		
2	1BD15CV066	Md. Shahnawaz ammanna	A	1	2	3	A	4	5	A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	A	23	24			0.5	7.5	11.5	10+5 = 15	
3	1BD15CV098	Sharath M	A	1	A	2	3	4	5	6	7	A	8	9	10	11	A	12	13	14	15	16	17	18	19	20	21	22	A	23			5.5	04	11.5	09+5 = 14	
4	1BD16CV040	Karthik G.S	1	2	3	4	5	A	6	7	8	9	10	A	11	12	13	14	15	16	A	17	18	19	20	21	A	22	23	24			15	15	20	17+10	27
5	1BD16CV064	Nithin S	1	2	3	A	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	A	18	19	20	21	A	22	23	24			Ab	20	30	17+10	27
6	1BD16CV098	Shivu R.S	1	A	2	3	A	4	5	6	7	8	9	A	10	11	12	13	14	15	16	17	18	19	A	20	21	22	23	24			07	15	19	14+10	24
7	1BD16CV112	Tabassum Banu H.N																																		
8	1BD16CV131	Prajwal S	1	A	2	3	A	4	5	6	7	8	9	10	11	12	13	14	15	16	17	A	18	19	20	21	22	23	24	25			14	22	26	21+10	31
9	1BD17CV006	Anil Raj	A	1	2	3	4	5	A	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26			08	29	23	20+10	30
10	1BD17CV008	Anusha. A. Doddamani	A	1	2	3	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26			30	30	30	30+10	40
11	1BD17CV010	Apeksha. B.U	A	1	2	3	4	5	6	7	A	8	9	A	10	11	12	13	14	A	15	16	17	18	19	A	20	21	22	23			28	26	30	28+10	38
12	1BD17CV012	Asif Ahemad. Nadaf	1	2	3	4	5	6	A	7	8	9	A	10	11	12	13	14	15	A	16	17	18	19	A	20	21	22	23	24			06	21	23	17+10	27
13	1BD17CV014	Bhavith K.A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25	26	27			27	30	28	29+10	39
14	1BD17CV016	Bhargav M.T	A	1	2	3	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25			28	30	28	29+10	39
15	1BD17CV018	Bindushree R	1	2	3	4	5	6	7	8	9	A	10	11	12	13	14	15	A	16	17	18	A	19	20	A	21	22	A	23			22	29	24	25+10	35
16	1BD17CV020	Chethan N.D	1	A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	A	18	19	20	A	21	22	23	24	25			25	27	30	28+10	38
17	1BD17CV022	Chethana. M.P	1	2	A	3	4	5	6	A	7	8	9	A	10	11	12	13	14	15	16	17	A	18	19	20	21	22	23	24			21	21	30	24+10	34
18	1BD17CV024	Darshankumar M.H	1	2	3	4	5	6	7	8	9	10	11	12	A	13	14	15	16	17	18	A	19	20	21	22	23	A	24	25			22	29	30	27+10	37
19	1BD17CV026	Divya H	1	2	3	4	A	5	6	7	8	9	10	11	12	13		14	15	16	17	18	19	20	21	A	22	23	24	25			29	28	30	29+10	39
20	1BD17CV028	Gnanavi K.V	1	2	3	4	5	6	7	8	9	A	10	11	12	13	14	15	A	16	17	18	19	20	21	22	23	24	25	26			23	21	30	25+10	35
21	1BD17CV030	Gowrav R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	17	18	19	A	20	21	22	23	24	25	26			30	28	30	30+10	40
22	1BD17CV032	Harish K.P	A	1	2	3	4	5	6	7	8	A	9	10	11	12	13	14	15	16	17	18	19	20	A	21	22	23	24	25			29	27	30	29+10	39
23	1BD17CV034	Holeraj R kapler	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	A	22	23	24	25	26	27			30	30	30	30+10	40
24	1BD17CV036	Jayalakshmi .V	1	2	3	4	5	6	A	7	8	A	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	A			27	27	15	23+10	33
25	1BD17CV038	Kashish V Parmar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25	26	27			27	28	28	28+10	38
26	1BD17CV040	Khafa Pasha																																		
27	1BD17CV042	Kushaal. K.B	1	2	3	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	18	19	20	21	22	A	23	24	25	26			18	22	30	24+10	34
28	1BD17CV046	Mallikarjun Attigar	A	1	2	3	A	4	5	6	7	8	A	9	10	11	12	13	14	15	16	17	18	19	20	21	22	A	23	24			30	26	30	29+10	39
29	1BD17CV048	Manjula M.D	1	2	3	A	4	5	6	7	8	9	10	11	12	13	14	15	A	16	17	18	19	20	21	22	A	23	24	25			28	29	29	28+10	38
30	1BD17CV050	Manoj M	1	2	3	4	5	6	7	8	9	10	11	A	12	13	14	15	16	17	18	19	20	21	22	A	23	24	25	26			30	24	28	27+10	37
		Initials of Teacher																																		
		Initials of H.O.D																																		

Class : IIIrd B | Subject Code : 17CV53 | Subject : Applied Geotechnical Engineering | Total No. of Classes : 50

Sl No.	USN	NAME	DATE	01/08/19	02/08/19	14/08/19	16/08/19	17/08/19	19/08/19	21/08/19	23/08/19	24/08/19	26/08/19	28/08/19	29/08/19	31/08/19	04/09/19	05/09/19	07/09/19	09/09/19	11/09/19	16/09/19	18/09/19	19/09/19	21/09/19	23/09/19	25/09/19	26/09/19	30/09/19	01/10/19	12/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	CIE Average	SEE Remarks
31	UBD17CV052	Nagaraj G.B																Detain																		
32	UBD17CV056	Nandeesh K.N		1	2	3	A	4	A	5	6	A	7	A	8	9	10	A	11	12	13	14	15	A	16	17	18	19	A	20	21			29	22	22	25+10	35
33	UBD17CV060	Nihal Raj S.T		1	A	2	A	3	4	5	A	6	7	A	8	9	10	A	11	12	A	13	14	15	16	17	18	A	19	20	A			14	28	28	22+10	32
34	UBD17CV062	Nisha V Shet		A	1	2	3	A	4	5	6	7	8	9	A	10	A	11	12	13	14	A	15	16	17	18	A	19	20	21	22			30	29	29	26+10	36
35	UBD17CV064	NVV Sathyanarayana		1	2	3	4	5	6	7	8	9	10	11	12	A	13	14	15	16	17	18	19	20	21	22	23	24	A	26	26			29	27	27	28+10	38
36	UBD17CV066	Pavithra B.R		1	A	2	3	4	5	6	7	A	8	9	10	11	A	12	13	14	A	15	16	17	18	19	20	21	A	22	23			26	29	30	27+10	37
37	UBD17CV068	Pooja K.R		1	2	3	4	A	5	6	7	A	8	9	10	11	12	13	14	15	16	17	18	A	19	20	21	22	23	24	25			29	27	21	26+10	36
38	UBD17CV072	Rahul K.S		A	1	2	3	4	5	6	7	8	A	9	10	11	12	13	14	A	15	16	17	18	19	A	20	21	22	A	23			Ab	14	18	11+10	21
39	UBD17CV074	Rakesh A.C		1	A	2	3	A	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	A	19	20	21	22	23	A	24			26	26	26	26+10	36
40	UBD17CV076	Rakshitha A.M		1	2	A	3	A	4	5	6	7	8	9	A	10	11	12	13	14	15	16	17	18	A	19	20	21	22	23	A			16	21	28	22+10	32
41	UBD17CV078	Rakshitha V.T.N		1	2	3	4	5	6	7	8	9	A	10	11	A	12	13	14	15	16	17	A	18	19	20	21	22	23	24	25			10	21	Ab	11+10	21
42	UBD17CV082	Shahana K		1	2	3	4	A	5	6	7	A	8	9	A	10	11	12	13	14	15	16	17	18	19	20	21	22	A	23	24			22	25	24	23+10	33
43	UBD17CV084	Sai Pratheek K.S		1	A	2	3	A	4	5	6	7	8	A	9	10	11	12	13	14	A	15	16	17	18	19	20	21	22	A	23			22	14	Ab	0+10	22
44	UBD17CV086	Sandeep R.H		1	2	A	3	A	4	5	6	A	7	8	A	9	10	A	11	12	13	14	15	A	16	A	17	A	18	19	20			30	25	26	27+10	37
45	UBD17CV088	Santaysh																Detain																		
46	UBD17CV090	Shankar T.R		A	1	2	3	4	5	6	7	8	9	0	11	A	12	13	14	15	16	17	18	19	20	21	22	23	24	25	A			25	16	23	24+10	34
47	UBD17CV092	Shashikumara M		1	2	A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	A	20	21	22	23	24	25	26			29	28	29	29+10	39
48	UBD17CV094	Shreepadha S.V		1	2	3	4	A	5	6	7	A	8	A	9	10	11	12	A	13	14	15	16	A	17	18	A	19	20	21	22			25	30	23	26+10	36
49	UBD17CV096	Suma J.S		A	1	2	A	3	4	5	6	A	7	8	9	A	10	11	12	13	14	15	16	A	17	18	19	20	21	22	23			20	23	28	24+10	34
50	UBD17CV102	Sushant M.M																Detain																		
51	UBD17CV104	Tejas V		A	1	A	2	3	4	5	6	7	8	A	9	10	11	12	13	14	15	16	17	18	A	19	20	21	22	A	23			16	17	20	18+10	28
52	UBD17CV108	Varsha V Arekal		A	1	2	A	3	4	5	6		7	A	8	9	10	11	12	13	14	15	16	17	18	19	20	A	21	22	23			21	20	25	22+10	32
53	UBD17CV110	Varshitha S		1	A	2	A	3	4	5	6	7	8	9	10	11	12	13	A	14	15	16	17	18	19	20	21	22	23	A	24			29	27	27	28+10	38
54	UBD17CV112	Vignesh M		1	A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	A	24	25	A			19	20	28	23+10	33
55	UBD17CV114	Vinay CT		1	2	3	4	5	6	7	8	9	A	10	11	12	13	14	15	16	17	18	19	20	21	22	A	23	24	25	26			28	22	29	27+10	37
56	UBD17CV118	Yashavanth O		A	1	A	2	3	A	4	5	6	7	8	9	10	A	11	12	13	14	15	16	17	18	19	20	A	21	22	23			14	22	13	17+10	27
57	UBD17CV120	Monica R.S		1	A	2	3	A	4	5	6	A	7	8	A	9	10	A	11	12	A	13	14	A	15	16	17	18	19	20	21			29	23	26	26+10	36
58	UBD18CV400	Ajay B.K		1	2	3	A	4	5	A	6	7	8	9	10	11	12	13	A	14	15	16	17	18	19	A	20	21	22	23	24			22	20	26	23+10	33
59	UBD18CV401	Akash U		1	2	3	4	5	A	6	7	8	A	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	A	25			25	23	20	23+10	33
60	UBD18CV402	Athish M Borkar		1	2	A	3	4	5	A	6	7	A	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			23	10	14	16+10	26
			Initials of Teacher																																	
			Initials of H.O.D																																	

Class : 5th B | Subject Code : 17CV53 | Subject : Applied Geotechnical Engineering | Total No. of Classes : 50

Sl No.	USN	NAME	09/08/19	10/08/19	14/08/19	16/08/19	17/08/19	19/08/19	21/08/19	23/08/19	24/08/19	26/08/19	28/08/19	29/08/19	31/08/19	04/09/19
61	4BD18CV404	Devaraj Aloor ✓	1	2	A	3	4	5	A	6	7	8	9	10	11	12
62	4BD18CV406	H Vijaykumar ✓	A	1	2	3	4	5	6	7	A	8	9	A	10	11
63	4BD18CV407	Halesh P. ✓	A	1	2	3	4	5	6	7	A	8	9	A	10	11
64	4BD18CV410	Kotresh H.S ✓	A	1	2	A	3	4	A	5	6	A	7	8	9	10
65	4BD18CV411	Krishna NT ✓	1	A	2	3	4	5	A	6	7	8	9	A	10	11
66	4BD18CV412	Lohith S ✓	1	2	3	A	4	A	5	6	A	7	8	9	10	11
67	4BD18CV414	Manjunath B ✓	1	2	A	3	4	5	6	7	A	8	9	A	10	A
68	4BD18CV415	Manjunath K.C ✓	1	2	3	4	5	6	A	7	A	8	A	9	10	11
69	4BD18CV416	Mohammed Aftab ✓	1	2	3	4	5	A	6	7	A	8	A	9	10	11
70	4BD18CV418	Niranjan B ✓	1	A	2	3	4	A	5	6	A	7	8	9	10	11
71	4BD18CV422	Ranjith Kottad ✓	1	A	2	3	A	4	A	5	6	7	8	9	10	11
72	4BD18CV424	Sagar A M ✓	1	A	2	3	4	5	6	7	A	8	9	A	10	11
73	4BD18CV425	Shankar S ✓	A	A	1	2	3	4	5	6	7	8	9	A	10	11
74	4BD18CV426	Srikanth gowdapatils	A	1	A	2	A	3	4	5	6	A	A	7	8	9
75	4BD17CV058	Nandini G.L ✓	1	A	2	3	4	A	5	6	7	A	8	9	10	11
76	4BD17CV096	Siddaraju R.V. ✓	A	1	2	3	4	5	6	7	8	9	10	11	12	A
		Initials of Teacher														
		Initials of H.O.D														

Sl No.	05/09/19	07/09/19	09/09/19	14/09/19	16/09/19	18/09/19	19/09/19	21/09/19	23/09/19	25/09/19	26/09/19	30/09/19	10/10/19	12/10/19	No. of Days Present	%	Test Marks I	Test Marks II	Test Marks III	CIE Average	Total Remarks
61	A	13	A	14	15	16	17	18	19	20	21	22	23	24			27	29	22	26+10	36
62	12	13	14	A	15	16	17	18	19	20	21	22	A	23			27	24	23	25+10	35
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65	12	13	A	14	15	16	17	18	19	20	21	22	23	A			18	Ab	20	13+10	23
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67	11	12	13	14	A	15	16	17	18	19	A	20	21	22			30	28	25	28+10	38
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73	12	13	A	14	15	16	17	18	A	19	A	20	A	21			05	11	19	12+10	22
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76	13	14	15	16	17	18	19	20	21	22	23	A	24	25			Ab	07	22	10+10	20
Initials of Teacher																					

5th Sem [A and B] Divisions

Title of the course :- Applied Geotechnical Engineering

Course :- 17CV53

MODULE - 01

Soil Exploration

MODULE - 01

SOIL EXPLORATION

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Assistant professor
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⇒ Introduction

The field and laboratory investigations required to obtain the necessary data for the soil for proper design and successful construction of any structure at the site are collectively called soil exploration

The choice of the foundation and its depth the bearing capacity, settlement analysis depend very much upon the various engineering properties of the foundation soils.

⇒ objectives of soil exploration

1) Determination of the nature of the deposits of soil
2) Determination of the depth and thickness of the various soil strata and their extent in horizontal direction
3) The location of ground water and fluctuations in ground water table
4) obtaining soil and rock samples from the various strata
5) The determination of the engineering properties of the soil and rocks strata that affect the performance of the structure.
6) Determination of the in-situ properties by performing field tests
7) To select the type and depth of foundation and to determine the bearing capacity of the selected foundation
8) To ensure the safety of surrounding existing structures.

Prof. & Head of Civil Engg. Dept
B. I. E. T. Davangere - 4

⇒ Stages in soil exploration

1) Reconnaisance
2) preliminary exploration
3) detailed exploration
4) laboratory testing

1) Stage 1: Reconnaissance

1) photographs of the site and its neighborhood
2) access to the site for workers and equipment
3) sketches of all fences, utility posts, driveways walkways, drainage systems, and so on
4) the utility services that available, such as water and electricity
5) sketches of topography including all existing structures, cuts, fills, ground depression, ponds etc

2) Stage 2: preliminary Exploration

1) boring are made or test pit is opened to establish in general manner the stratification,
2) type of soil to be expected and possibly the location of the ground water table
3) The initial borings indicate the upper soil is loose & highly compressible.
4) site data and sample recovery to approximate -ly establish the foundation design and identify the construction procedures
5) index properties such as liquid limit, plastic -ity index, and penetration data, together with unconfined compression tests on samples

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3) Stage 3:- detailed exploration
1) If the soil is relatively uniform in stratification
2) To determine the geological structure which should include the thickness, sequence and extent of the soil strata
3) To determine the groundwater conditions
4) To obtain disturbed and undisturbed samples for laboratory tests
5) To conduct in situ tests

4) Stage 4:- laboratory testing
1) To classify the soils
2) To determine soil strength, failure stresses and strains, stress, strain response, permeability, compactability, and settlement parameters

* methods of explorations
1) Direct method
2) Semi Direct method
3) Indirect method

1) Direct method
⇒ Trial pits
Applicable to all types of soils provide for visual examination in their natural condition disturbed and undisturbed soil samples can be conveniently obtained at different depths
Depth of investigation is limited to 3 to 3.5m

Advantages
1) cost effective
2) provide detailed information of stratigraphy
3) large quantities of disturbed soils are

available for testing
4) large blocks of undisturbed samples can be carved out from the pits
5) field tests can be conducted at the bottom of the pits

Disadvantages
1) depth limited to about 6m
2) deep pits uneconomical
3) excavation below groundwater and into rock difficult and costly
4) Too many pits may scar site and require backfill soils

Limitations
1) undisturbed sampling is difficult
2) collapse in granular soils or below ground water table

* Semi direct method
⇒ Boring techniques
making or drilling bore holes into the ground with a view to obtaining soil or rock samples from specified or known depths is called boring
The common methods of advancing bore holes are
1) Auger boring
2) Auger and shell boring
3) wash boring
4) percussion boring
5) Rotary drilling

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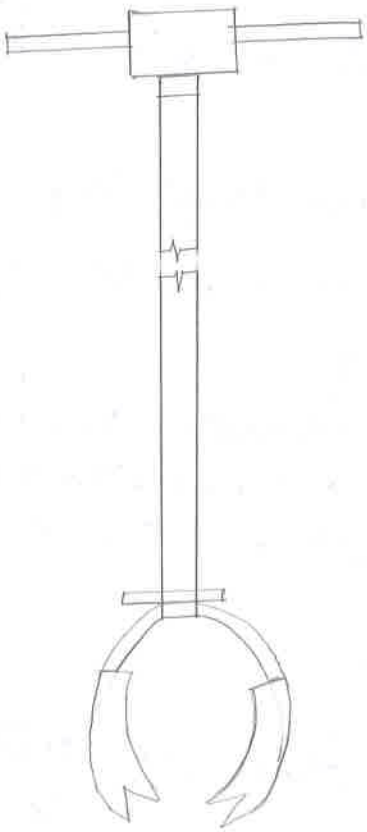
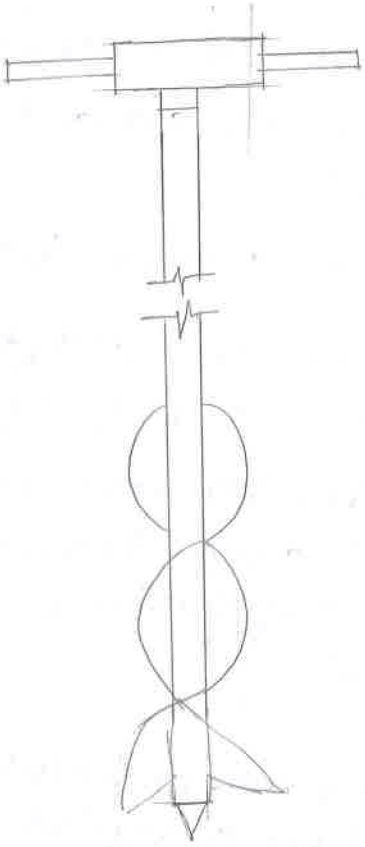
1) Auger boring



(a) post hole auger



(b) Helical auger

1) auger is carried out by holding it vertically and pressing it down while the auger is rotated
2) The turning action cuts the soil which fills the annular space
3) one the annular space is filled the auger is withdrawn and cleaned
4) The cleaned auger is again inserted in the hole and the process repeated

⇒ hand operated augers are of two types

a) post hole auger
b) Helical auger

1) Hand operated augers may be used for boring holes to a depth 6m in soft soils
2) Side of the hole are likely to cave in casing pipe may be used to prevent the collapse of the sides of boreholes

3) power driven augers are used for greater boring depths and where hard or stiff soil strata are encountered

4) auger boring is convenient in the case of partially saturated sands, silts, and medium to stiff cohesive soils

5) as possible. auger borings are kept dry

6) augers are severely disturbed soil & is useful for identification purpose only

7) augers boring are used for shallow foundations highways and barrow pits where the required depth of exploration is relatively small

advantages

1) quick
2) used in uncased holes
3) undisturbed samples can be obtained quite easily
4) drilling mud not used
5) groundwater location can easily be identified

disadvantages

1) depth limited to about 1.5m at greater depth drilling becomes difficult and expensive
2) site must be accessible to motorized vehicle

8) auger boring or shell boring

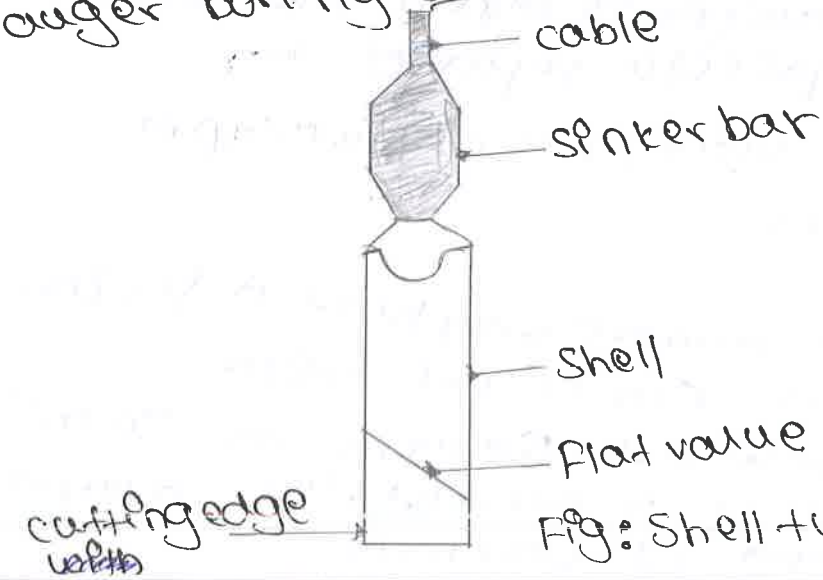


Fig: Shell tube or auger boring

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1) It is widely used in India. a shell also called a sand bailer
2) It is heavy duty pipe with a cutting edge
3) different lengths and weights are used according to requirements
4) sinker bars are sometimes used to add weight to the bailer
5) The shell is raised and let fall in a hole
6) after that soil that is cut enters the tube which is emptied when full
7) when shell is used augering becomes difficult.

3) wash boring

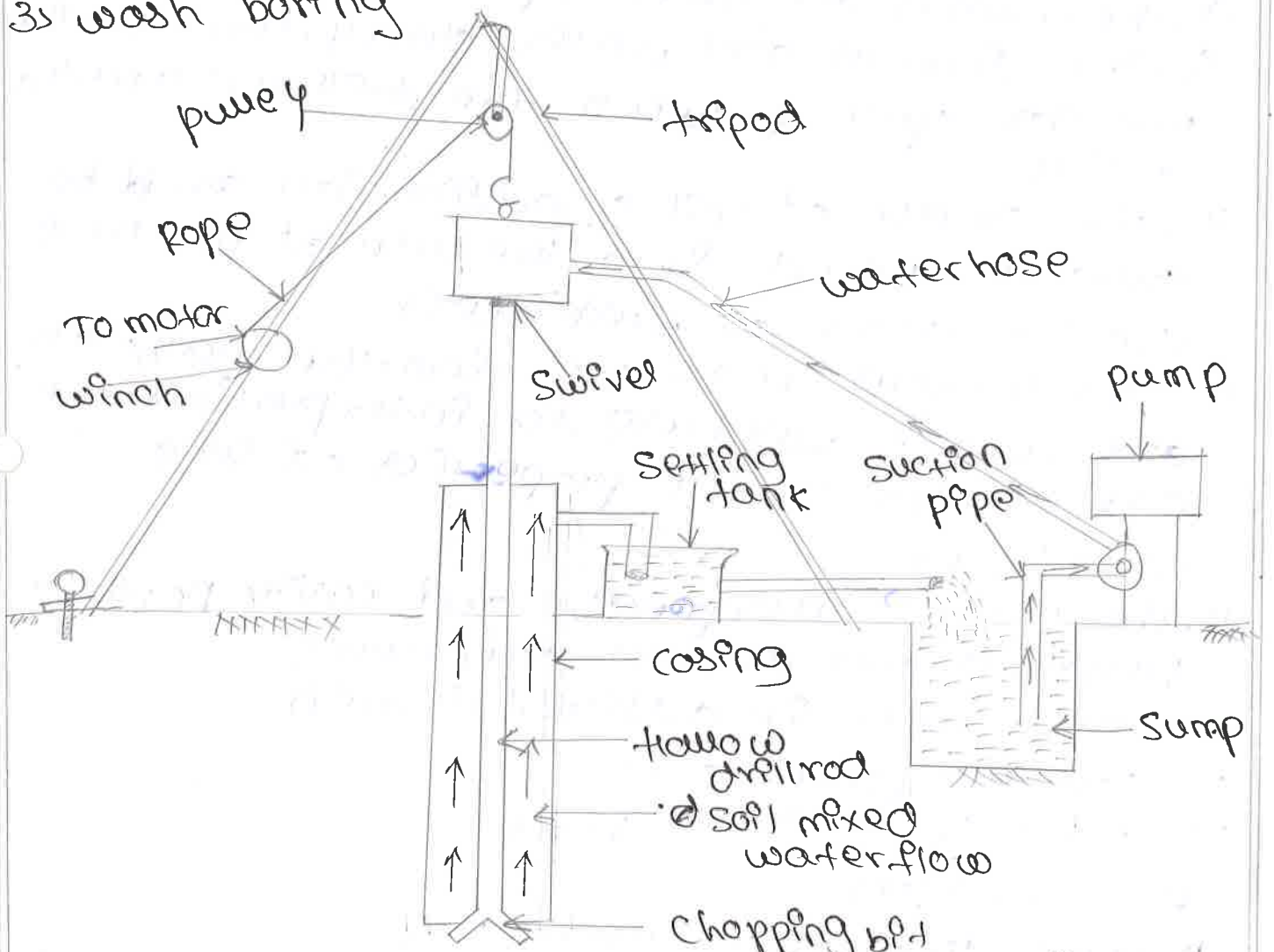

Fig: wash boring

1> wash boring is a fast and simple method for advancing holes in all types of soils

2> Boulders and rocks cannot be penetrated by this method

3> The method consists in first driving a casing through which a hollow drill rod with a sharp chisel or chopping bits at the lower end is inserted

4> water is forced under pressure through the drill rod which is alternatively raised and dropped and also rotated

5> The resulting chopping and jetting action of bit and water disintegrates the soil

6> The cuttings are forced up to the ground surface in the form of soil water slurry through the annular space between the drill rod and the casing

7> The change of soil stratification ~~could be~~ could be guessed from the rate of progress and the colour of wash water

8> The samples recovered from the washwater are almost valueless for interpreting the correct geotechnical properties of soils

Advantages

1> The use of inexpensive and easily portable handling and drilling equipments

2> can be used in difficult terrain

3> low equipment costs

4> used in uncased holes

Disadvantages

1> Depth limited to about 30m

2> slow drilling through stiff clays and gravels

3> difficulty in obtaining accurate location of groundwater level

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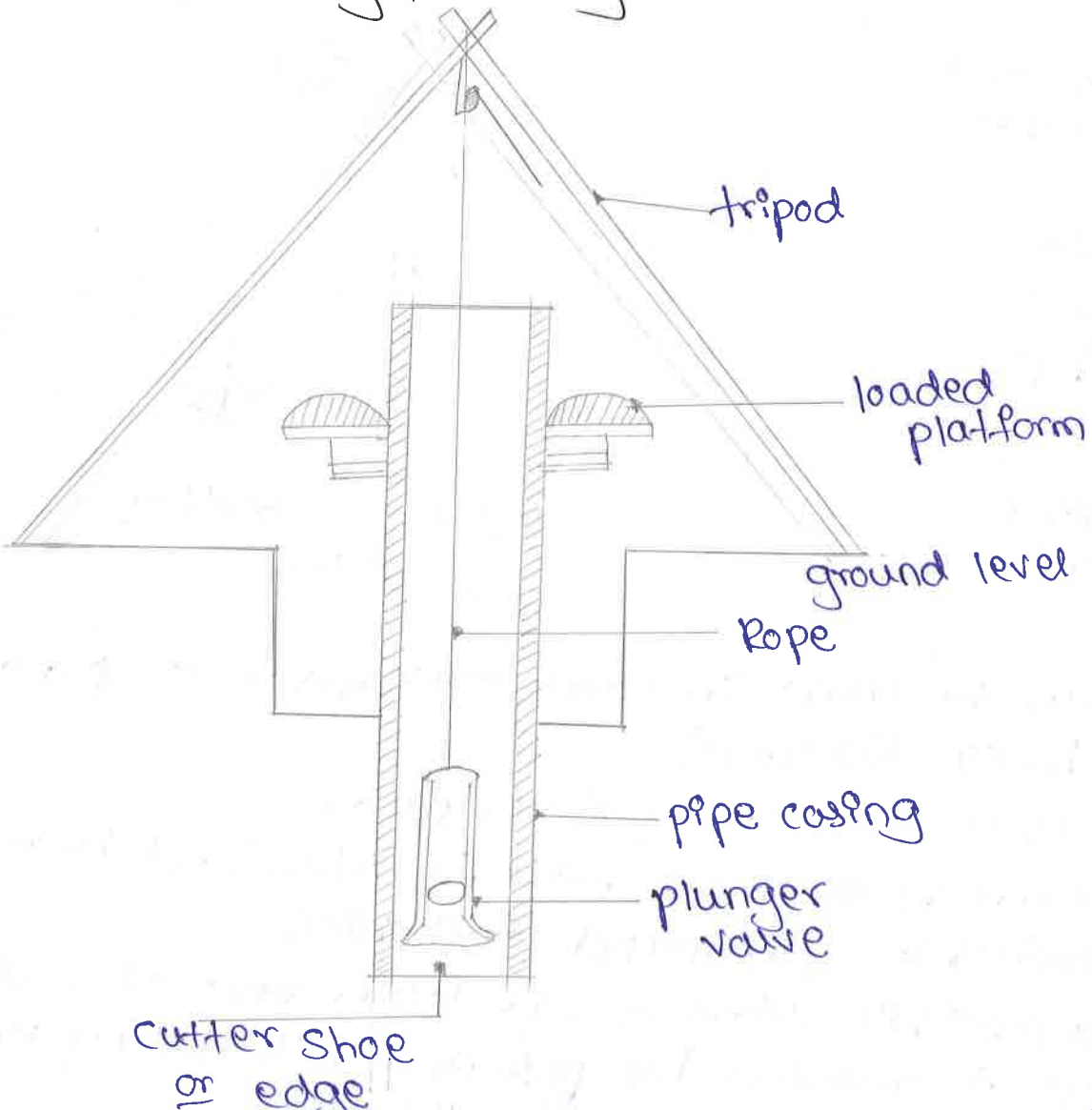
4> undisturbed soil samples cannot be obtained

4> percussion drilling or boring



1> The method cannot be used in loose sand and is slow in plastic clay

2> The formation gets badly disturbed by impact

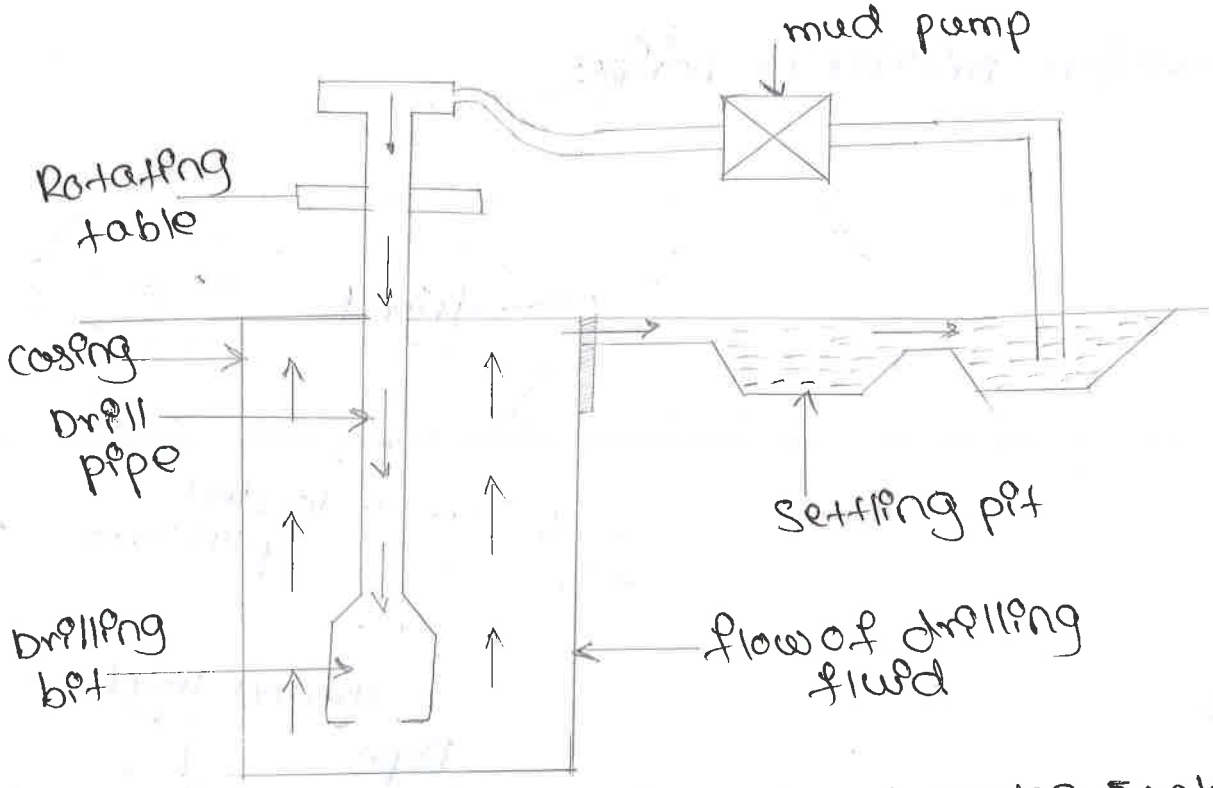
3> a heavy drill bit is suspended from a drill rod or a cable and is driven by repeated blows

4> water is added to facilitate the breaking of stiff soil or rock

5> The slurry of the pulverised materials is bailed out at intervals

6> this method only suitable for drilling boreholes in bouldery and gravelly strata

5> Rotary Boring



1> can be used in sand, clay and rocks (unless badly fissured)
2> this is a very fast method
3> even rock cores may be obtained by using suitable diamond drill bits
4> a drill bit fixed to the lower end of a drill rod is rotated by power while being kept in firm contact with the hole
5> drilling fluid or bentonite slurry is forced under pressure through the drilling rod and it comes up bringing the cuttings to the surface
6> when soil samples are required the drilling rod raised and drilling bit is replaced by a sampler

Advantages
1> quick
2> can drill through any type of soil or rock
3> undisturbed samples can easily be recovered

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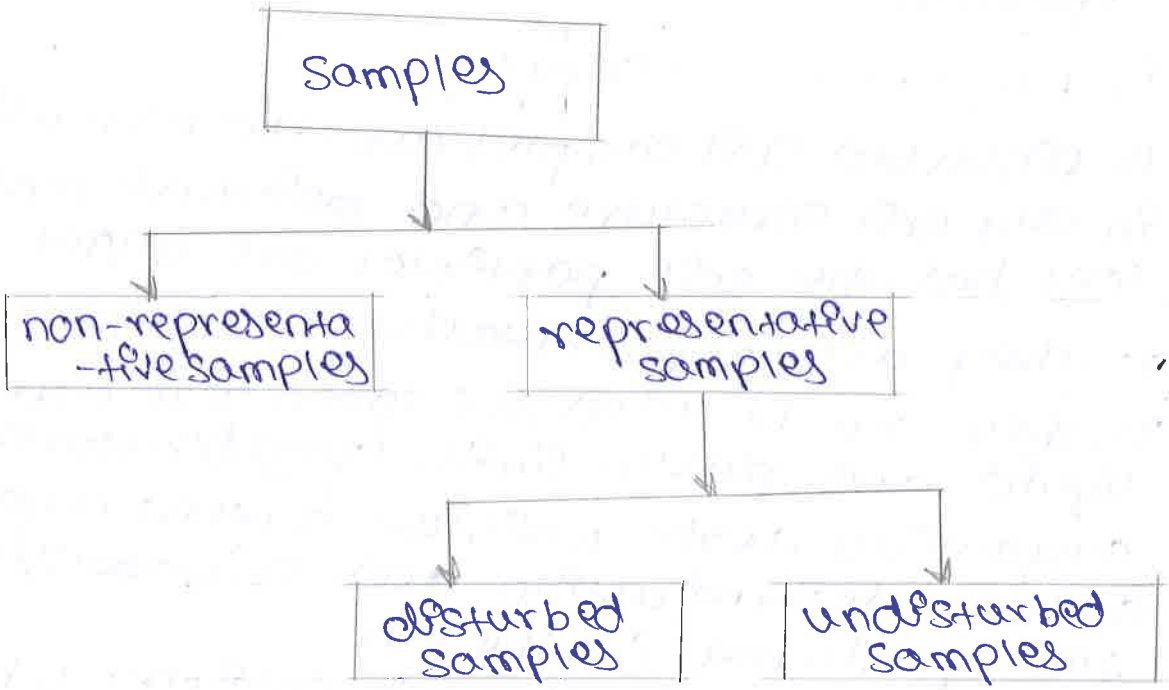
Disadvantages

1) Expensive equipment
2) Terrain must be accessible to motorized vehicle
3) Difficulty in obtaining location of groundwater level
4) additional time required for setup and cleanup.

* samples



⇒ non representative samples

1) mixture of materials from various soil or rock strata or are samples from which some mineral constituents have been lost or get mixed up soil samples
2) auger borings or wash borings are non-representative samples
3) they are not representative
4) these are suitable only for providing qualitative information such as major changes in subsurface strata

⇒ Representative samples

1) Soil structure get modified or destroyed during the sampling operation
2) The water content may also have changed
3) Structure of the soil may be significantly disturbed
4) They are suitable for identification and for the determination of certain physical properties such as atterberg limits and grain specific gravity.

(I) Disturbed soil samples

1) Disturbed soil samples are those in which the in-situ soil structure and moisture content are lost. but the soil particles are intact
2) They are representative samples
3) They can be used for grain size analysis. liquid and plastic limit, specific gravity, compaction tests, moisture content organic content determination and soil classification test performed in the lab
examples :- obtain through cuttings while augering, grab, split spoon (SPT), etc

(II) undisturbed soil samples

undisturbed soil samples are those in which the in-situ soil structure and moisture content are preserved

1) They are representative and also intact
2) These are used for consolidation, permeability or shear strengths etc [engineering properties]
3) more complex jobs & where clay exist.
4) In sand is very difficult to obtain undisturbed sample

MODULE – 02

Stress in Soils

Stress in soils

Introduction

Stresses are induced in a soil mass due to self weight of soil and due to structural loads applied at or below the ground surface

The vertical stress at depth z below ground surface due to self weight of soil is given by

$$\sigma_z = \gamma z$$

where σ_z = vertical stress

z = depth below ground surface

γ = unit weight of soil.

The estimation of vertical stresses at any point in a soil mass due to external loading is essential to the prediction of settlements of buildings, bridges, and pressure

Is Stress and settlements within a soil massare caused by both external and internal loading

a) External loading

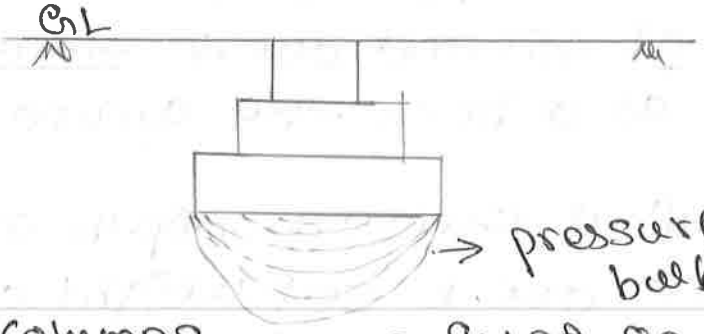
External loading includes vertical loads applied on the ground surface or near the ground surface

b) Internal loading

Internal loading is applied inside the soil mass away from the ground surface

ex: piles

2> foundation pressure transmitted to soil strata at various elevations below footings



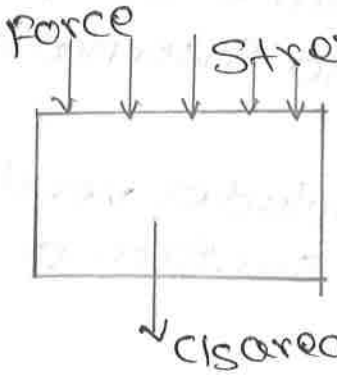
3> beam, columns. transmitted in all downward and lateral directions

Stress

The ratio of external or internal restoring force by a per unit area

external = Internal

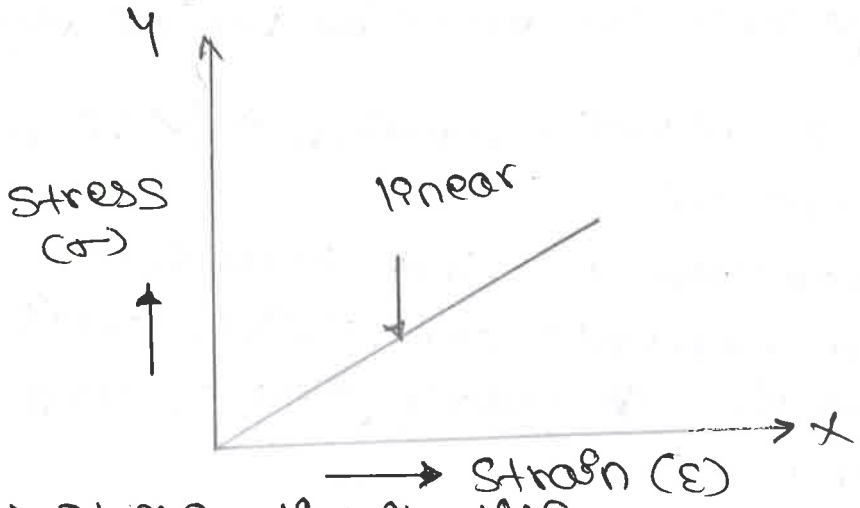
stress = external restoring force / ratio of c/s area



$\text{Stress} = \frac{F}{A} = N/m^2$

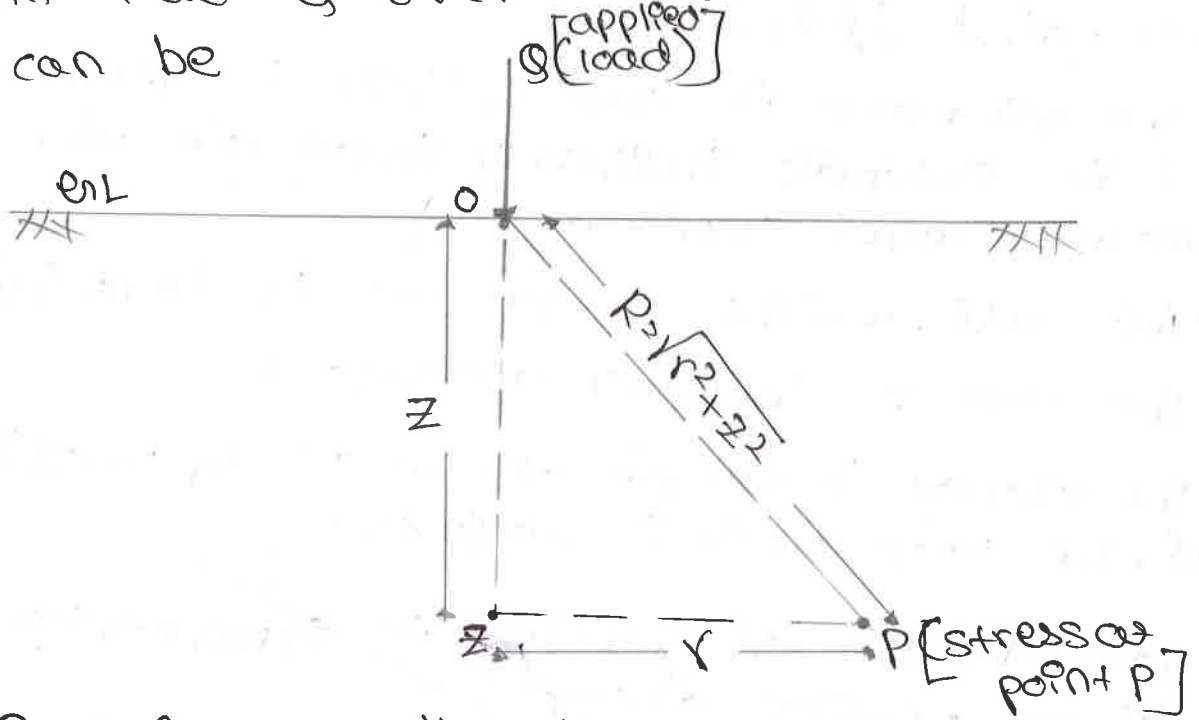
when applied force on body the change in size and shape of the body

* It is generally assumed that the soil mass is homogeneous and ~~is~~ isotropic the stress strain relationship is assumed to be linear



⇒ Stress distribution

* Stress at any point 'P' in soil mass due to point load 'Q' over the surface at point 'O' can be



a> Boussinesq's theory
b> westergaard's theory

a> Boussinesq's theory

Boussinesq's theory is 1885 has given solution the stress caused by the application of point load at the surface of homogeneous, elastic and Isotropic medium

⇒ Following assumptions are made by Boussinesq's

1> The soil mass is an elastic medium for which elasticity E is constant

2> The soil mass is homogeneous, that is all its constituent parts or elements are similar and it has identical properties at every point in it in identical directions

3> The soil mass is isotropic, that is it has identical properties in all directions through any point of it

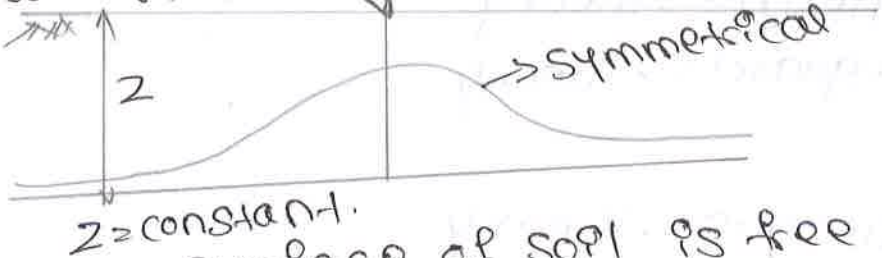
4> The soil mass is semi-infinite in extent, that is it extends infinitely in all directions below a level surface

5> The self-weight of the soil is ~~neglected~~ ignored

6> The soil is initially unstressed

7> the change in volume of the soil upon application of the load on it is neglected

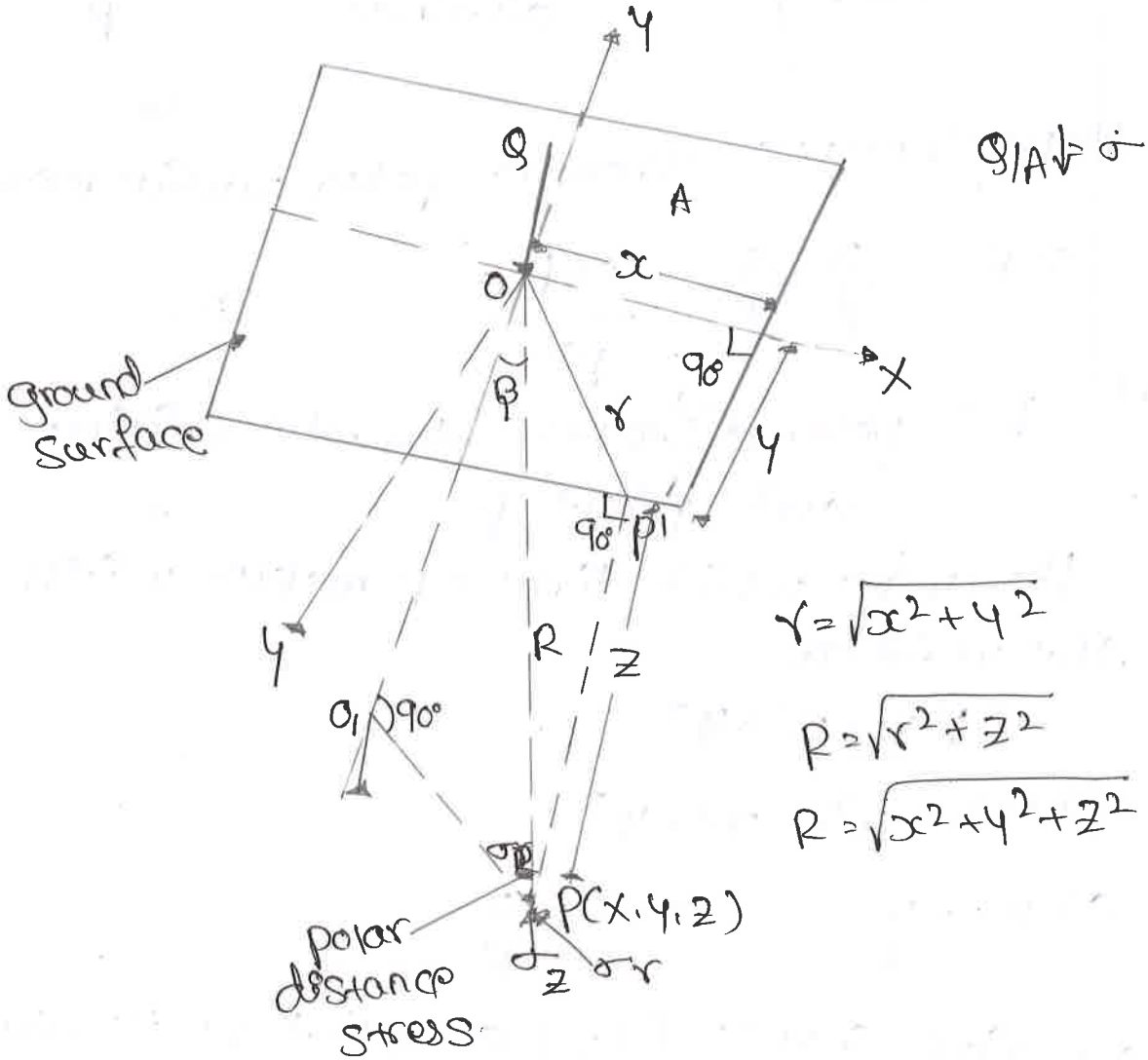
8> distribution of stresses is symmetrical about vertical axis



9> The top surface of soil is free from shear stress and is subjected to normal stress

10> continuity of stress is maintained in the medium

Let a point load Q (vertical load) act at the ground surface at a point O which may be taken as the origin of the x, y and z-axes as shown let us find the stress components at a point P in the soil mass having coordinates x, y and z or having a radial horizontal distance r and vertical distance Z from the point O.

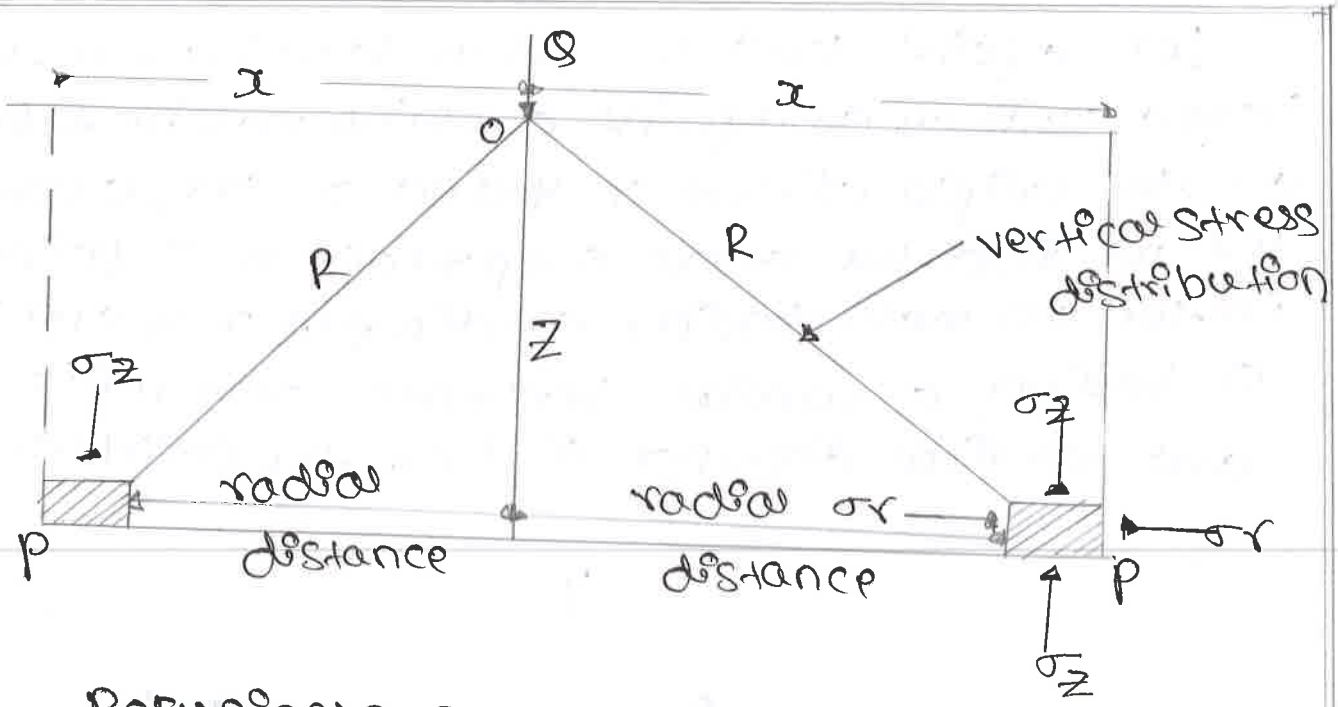


$\sigma = Q/A$

$r = \sqrt{x^2 + y^2}$

$R = \sqrt{r^2 + z^2}$

$R = \sqrt{x^2 + y^2 + z^2}$



Boussinesq's showed polar radial may be

$$\sigma R = \frac{3}{2}\frac{Q}{\pi}\frac{\cos\beta}{R^2} \quad \text{——— (1)}$$

where R = polar distance blw the original 'o' and point 'p'

β = angle which line op makes with the vertical

$$R = \sqrt{r^2 + z^2}$$

where $r^2 = x^2 + y^2$

$$\sin\beta = \frac{r}{R} \qquad \cos\beta = \frac{z}{R}$$

Vertical stress (σ_z) at point 'p' is given

$$\sigma_z = \sigma R \cos^2\beta \quad \text{—— (2)}$$

$$= \frac{3}{2\pi}\left(\frac{Q\cos\beta}{R^2}\right) \times \cos^2\beta$$

$$= \frac{3Q}{2\pi}\left[\frac{\cos^3\beta}{R^2}\right]$$

$$= \frac{3Q}{2\pi} \left[\frac{\left(\frac{Z}{R}\right)^3}{R^2} \right] \qquad \because \cos\beta = \frac{Z}{R}$$

$$\sigma_z = \frac{3Q}{2\pi} \left[\frac{Z^3}{R^5} \right] \qquad \text{---------- (3)}$$

dividing and multiplying Z^2

$$= \frac{3Q}{2\pi} \left[\frac{Z^2}{Z^2} \times \frac{Z^3}{R^5} \right]$$

$$= \frac{3Q}{2\pi} \left[\frac{Z^5}{Z^2 R^5} \right]$$

$$= \frac{3Q}{2\pi} \times \frac{1}{Z^2} \left[\frac{Z^5}{R^5} \right] \qquad \because \quad R = \sqrt{r^2 + Z^2}$$

$$R = (r^2 + Z^2)^{1/2}$$

$$= \frac{3Q}{2\pi} \times \frac{1}{Z^2} \left[\frac{Z^5}{(r^2+Z^2)^{5/2}} \right]$$

dividing by Z^5

$$= \frac{3Q}{2\pi} \times \frac{1}{Z^2} \left[\frac{Z^5}{(r^2+Z^2)^{5/2}} \right] \times \frac{1}{Z^5}$$

$$= \frac{3Q}{2\pi} \times \frac{1}{Z^2} \left[\frac{Z^5/Z^5}{\left[\frac{r^2}{Z^5} + \frac{Z^2}{Z^5}\right]^{5/2}} \right]$$

$$= \frac{3Q}{2\pi} \times \frac{1}{Z^2} \left[\frac{1}{\left[\frac{r^2}{Z^5} + \frac{Z^2}{Z^5}\right]^{5/2}} \right]$$

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multiplying by z^3

$$= \frac{3Q}{2\pi} \times \frac{1}{z^2} \left[\frac{1}{\left[\frac{r^2}{z^3} \times z^3 + \frac{1}{z^3} \times z^3 \right]^{5/2}} \right]$$

$$= \frac{3Q}{2\pi} \times \frac{1}{z^2} \left[\frac{1}{\left[\frac{r^2}{z^2} + 1 \right]^{5/2}} \right]$$

$$= \frac{3Q}{2\pi} \times \frac{1}{z^2} \left[\frac{1}{\left[1 + \frac{r^2}{z^2} \right]^{5/2}} \right]$$

$$\sigma_z = \frac{3Q}{2\pi} \times \frac{1}{z^2} \left[\frac{1}{\left[1 + \left(\frac{r}{z} \right)^2 \right]^{5/2}} \right]$$

$$\boxed{\sigma_z = \frac{3}{2\pi} \frac{Q}{z^2} \left[\frac{1}{\left[1 + \left(\frac{r}{z} \right)^2 \right]^{5/2}} \right]}$$

Boussinesq equation

$$I_B = \frac{3}{2\pi} \left[\frac{1}{\left[1 + \left(\frac{r}{z} \right)^2 \right]^{5/2}} \right]$$

I_B = Boussinesq influence factor

$$\sigma_z = I_B \frac{Q}{z^2}$$

* limitations

1> The solution was derived assuming the soil as an elastic medium. but the soil doesnot behave as an elastic material

2> when the stress decrease occurs in soil the relation between the stress and the strain is not linear as assumed. therefore. the solution is not strictly applicable

3> In deep sand deposits. the modulus of elasticity increases with an increase in depth and therefore the Boussinesq's solution will not give satisfactory results

4> the point loads applied below ground surface causes somewhat smaller stresses than are caused by surface loads. and therefore. the solution is not strictly applicable.

b> westergaard's solution

1> actual sedimentary deposits are generally anisotropic

2> thin layers of sand embedded in homogeneous clay strata

3> westergaard's solution assumes that there are thin sheets of rigid materials sand -wiched in a homogeneous soil mass.

4> thin sheets are closely spaced and are of infinite rigidity and prevent the medium from undergoing lateral strain

according to westergaard the vertical normal stress σ_z at a point 'P' at a depth z below the point load 'Q'

$$\sigma_z = \frac{c/2\pi}{\left[c^2 + \frac{r^2}{z}\right]^{3/2}} \frac{Q}{z^2}$$

where c depends upon the poisson ratio (μ)

$$c = \sqrt{\frac{(1-2\mu)}{(2-2\mu)}}$$

For elastic material the value of μ varies between 0 to 0.5

$\mu = 0$ and $c = 1/\sqrt{2}$

is assumed that there is lateral restrained

$$\sigma_z = \frac{1}{\pi\left[1 + 2\left(\frac{r^2}{z}\right)\right]^{3/2}} \frac{Q}{z^2}$$

$$\sigma_z = \frac{1}{\pi\left[1 + 2\left(\frac{r}{z}\right)^2\right]^{3/2}} \frac{Q}{z^2}$$

$$\sigma_z = I_w \frac{Q}{z^2}$$

where $I_w = \frac{1}{\pi\left[1 + 2\left(\frac{r}{z}\right)^2\right]^{3/2}}$ is known as westergaard's influence factor.

* comparison between Boussinesq's and westergaard's solutions

(1) I_w are considerably smaller than the Boussinesq influence factor (I_B)

(2) the westergaard influence factor is about 2/3 of the Boussinesq value for small values

5th sem [A and B] divisions

course title :- Applied Geotechnical Engineering

subject code :- 17CV53

MODULE - 03

Lateral Earth pressure and stability of slopes

module-03
Lateral earth pressure

Introduction

This important property influences the design of retaining walls abutments, bulkheads, sheet pile walls, basement walls and underground conduits which retain or support soil, and as such is of very great significance, The soil mass retained or supported by the retaining structures is called backfill which may have its top surface horizontal or inclined. The portion of the backfill lying above a horizontal plane at the level of the top of the retaining structures is called surcharge and its inclination to the horizontal is called surcharge angle β, Retaining walls are constructed in various fields of civil Engineering such as hydraulics and irrigation structures, highways, railways, tunnels, mining and military engineering

⇒ different type of lateral earth pressure

1) co-efficient of earth pressure at rest (k_o)
2) co-efficient of active earth pressure (k_a)
3) co-efficient of passive earth pressure (k_p)

1) earth pressure at rest

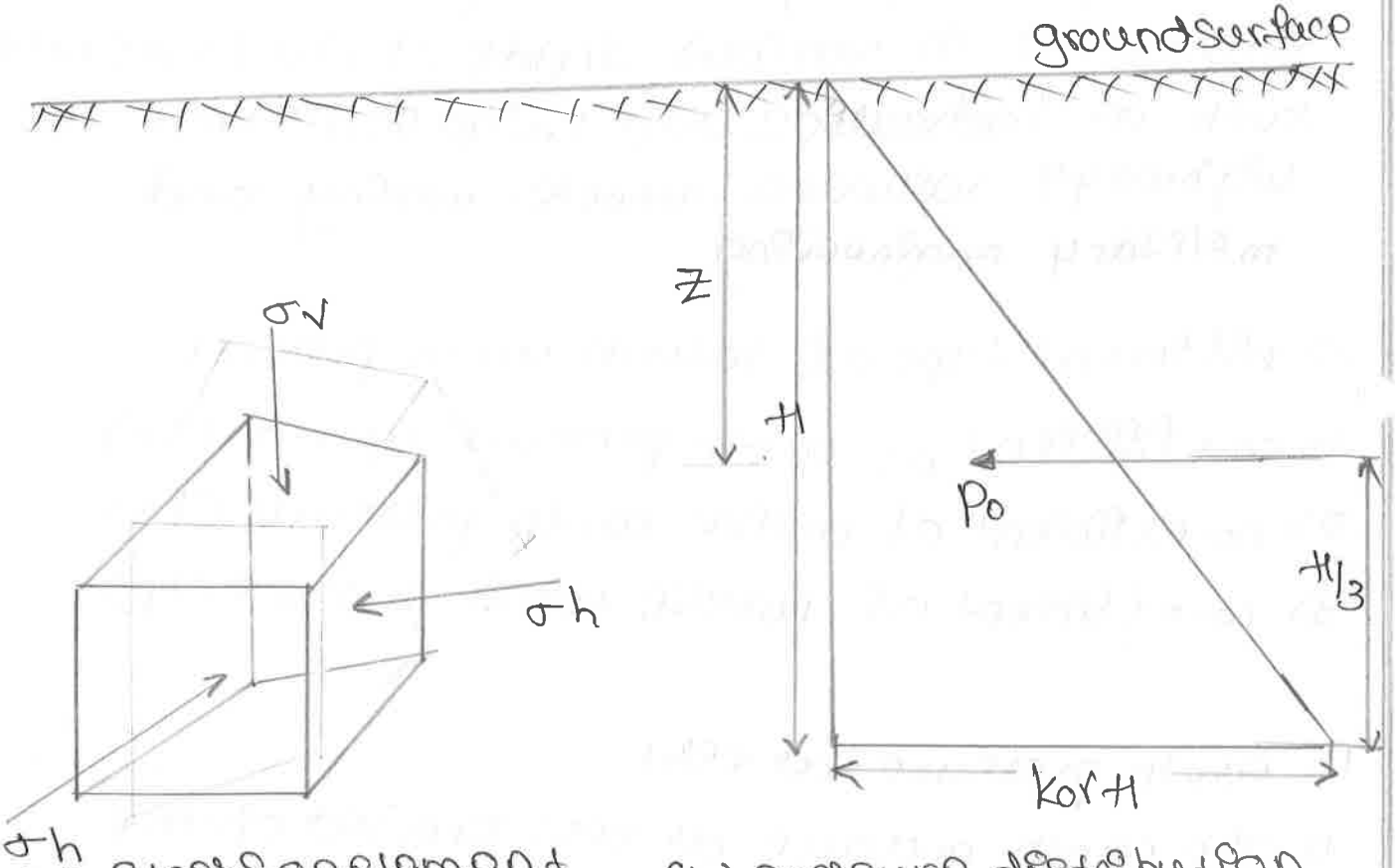
1) The earth pressure at rest exerted on the back of a rigid, unyielding retaining structure.
2) determined by using the theory of elasticity

assuming the soil to the semi-infinite, homogeneous elastic and isotropic.

Consider an element of soil at a depth 'Z' being acted upon by vertical stress σ_v and horizontal stress σ_h as shown in figure, there will be no shear stress. and hence σ_v and σ_h are the principal stresses.

Let E and μ be the modulus of elasticity and poisson's ratio of the soil respectively, the lateral strain ε_h in the horizontal direction

$$\varepsilon_h = \frac{1}{E}\left[\sigma_h - \mu\left[\sigma_v + \sigma_h\right]\right]$$



(a) Stress on element of soil at depth Z

(b) pressure distribution for a depth H

Fig:- Stress conditions relating to earth pressure at rest

Soil deforms vertically under its self weight but is prevented from deforming laterally because of an infinite extent in all lateral directions. the earth pressure at rest corresponds to the condition of zero lateral strain [$\varepsilon_h = 0$]

$$\sigma_h = \mu [\sigma_v + \sigma_h]$$

$$\frac{\sigma_h}{\sigma_v} = \frac{\mu}{1-\mu} = k_o$$

where k_o is coefficient of earth pressure at rest which is the ratio of the intensity of the earth pressure at rest to the vertical stress at a ~~de~~ specified depth

lateral pressure (σ_h) at rest by P_o and substituting $\sigma_v = \gamma z$ where γ is the appropriate unit weight of the soil depending on its condition

$$P_o = k_o \gamma z.$$

The distribution of the earth pressure at rest with depth is thus linear (or of hydrostatic nature) for constant soil properties such as E, μ and γ

Structure such as a retaining wall of height H, the pressure distribution diagram is thus triangular with zero intensity at $z = 0$ and intensity of $k_o \gamma z$ at the base of the wall where $z = H$. the total earth pressure P_o per unit length of the wall

$$P_o = \int_0^H k_o \gamma z \, dz = \tfrac{1}{2} k_o \gamma H^2$$

$$P_o = \frac{1}{2} k_o \gamma H^2$$

Considered to act at $(1/3)H$ above the base of the wall

$$k_o = (1 - \sin\phi)$$

The at rest condition does not involve failure of the soil, but represents a state of elastic equilibrium

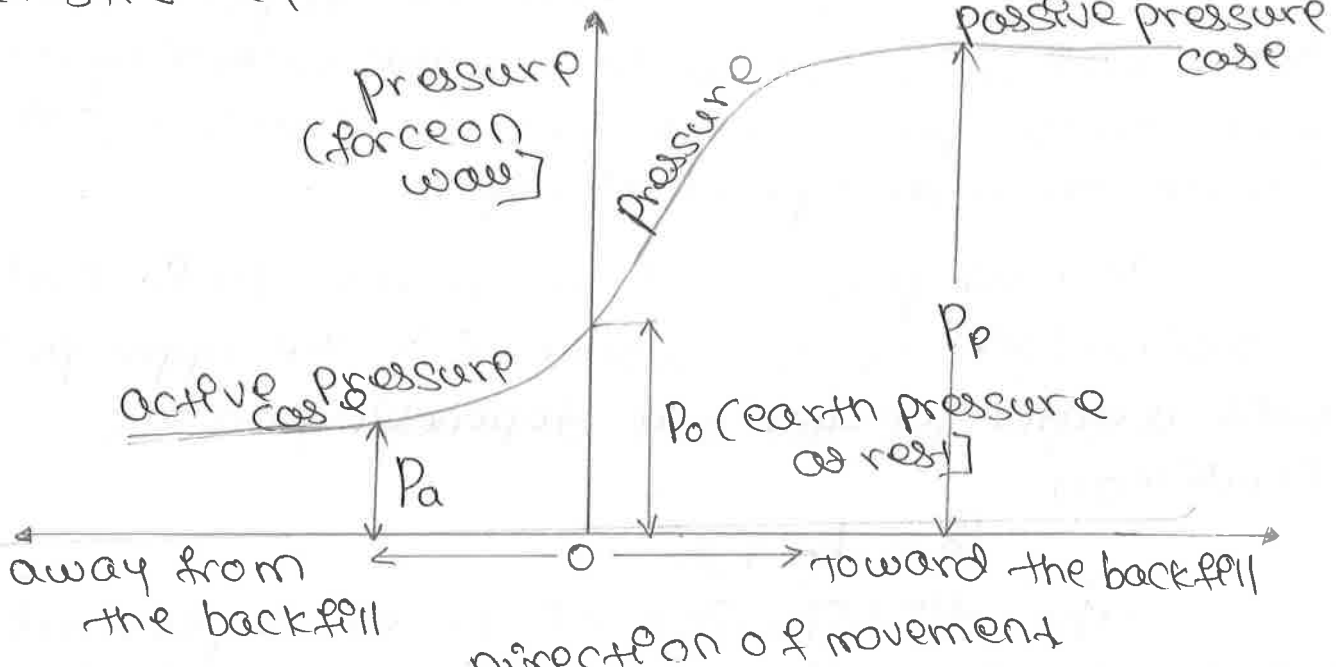


Fig: Relation between lateral earth pressure and movement of wall

as active earth pressure

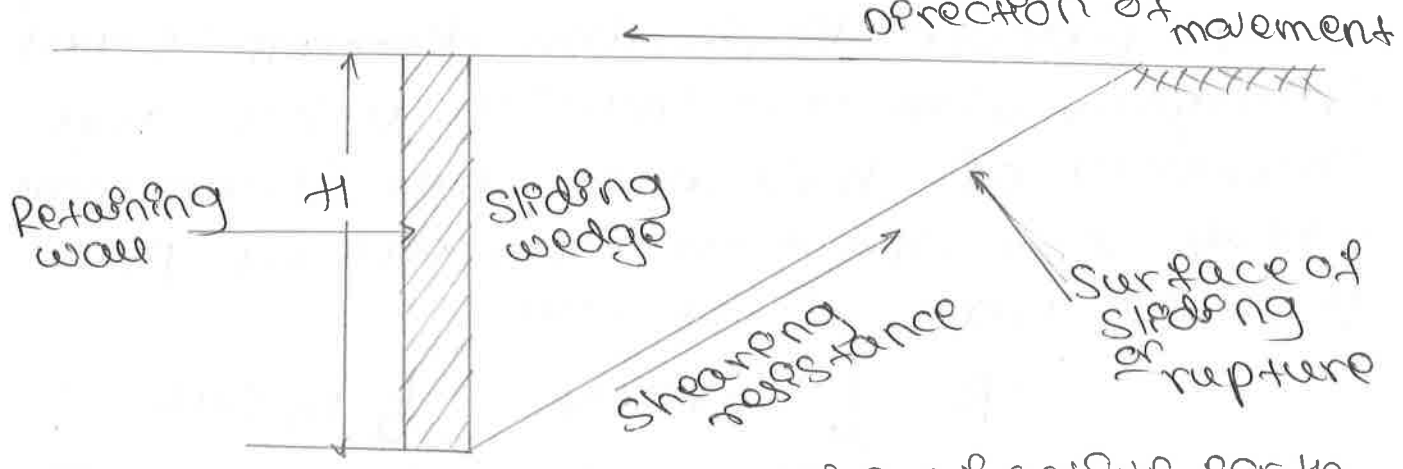


Fig:- conditions in the case of active earth pressure

1) earth pressure is said to be active if the structure tends to move away from the fill and if the structure is removed the retained soil will move in the forward / downward direction

2) the soil mass behind the wall tends to fail and this mass will exert pressure on the wall.

3) The coefficient of the earth pressure corresponding to the minimum pressure on the wall is the coefficient of the active earth pressure.

4) the soil mass is active in exerting pressure on the wall and hence the term active earth pressure

5) active earth pressure co-efficient (K_a) is the ratio between the lateral and vertical principal effective stresses at the limiting stress state when an earth retaining structure moves away (by a small amount) from the backfill (retained soil)

3) passive earth pressure

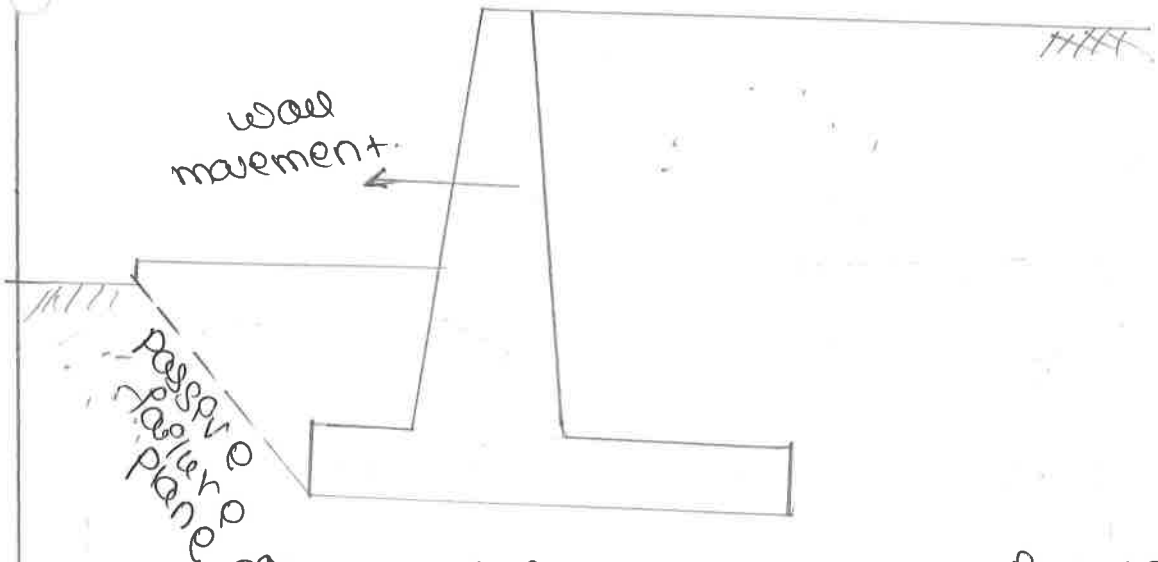


Fig:- conditions in the case of passive earth pressure

1) passive pressure means the structure tends to move towards the fill and the fill itself moves backward / upwards

2) press the wall into the soil mass as larger mass of earth than in the active state exerts resistance to the movement.

3) It is in a passive state and the earth has to be pushed up as failure.

4) The pressure required for a failure to happen is called passive earth pressure.

5) The passive pressure is used as the soil is in a passive state.

6) the corresponding coefficient of earth pressure is called the passive pressure coefficient

7) passive earth pressure coefficient (k_p) is the ratio between the lateral and vertical principal effective stresses at the limiting stress state when an earth retaining structure is forced against a soil mass

8) The active pressure is the minimum likely pressure on a retaining structure and the passive pressure is the maximum likely. the at rest pressure usually lies between these two extremes active and passive pressure may occur simultaneously on different parts of a structure

⇒ difference between active and passive pressure

active ~~pressure~~ pressure	passive pressure
1) very little movement is required to mobilise the active pressure (about 0.5% horizontal strain)	is much higher movement is required to mobilise the pressure (about 2% horizontal strain)

5th sem [A and B] Divisions

Course title :- Applied Geotechnical Engineering

Subject code :- 17CV53

MODULE - 04

Bearing capacity of Shallow foundation

Module - 04

Bearing capacity of Shallow foundation

Introduction

Foundation

Foundation is the lowest part of a structure which provides a base for the superstructure. the term foundation includes the portion of the structure below the ground level as well as the artificial arrangement of concrete block, piles, raft, grillage, etc. provided to transmit the loads on the structure including the dead weight of the structure itself to the soil below

The function of the foundation is to transfer the load of the superstructure to the underlying soil formation without overstressing the soil. Hence a safe foundation design provides for a suitable factor against

(1) Shear failure of the soil

(2) Excessive settlement

⇒ purpose of foundation

1> to distribute the weight of the structure over larger area so as to avoid overloading of the soil beneath

2> to load the sub-stratum evenly and thus prevent unequal settlement

3> to provide a level surface for building operations

4> to increase the stability of the structure by taking it deep into the ground

⇒ type of foundation

1> Shallow foundations

2> Deep foundations

1> Shallow foundations

i> Spread footings

ii> Strap footing

iii> combined footings

iv) mat or raft foundation

i> spread footings

(1) ~~The base~~ spread footings or simply footing is used to transmit the load from a wall or a column over a sufficiently large area of foundation soil

2> This is most common type of shallow foundation

(a) Isolated footings

(i) spread footing is provided to support an individual column it is called isolated footing

2> used for reinforced concrete buildings

3> isolated footing may be square, rectangular, or circular

4> the footing of a column is also called as pad foundation

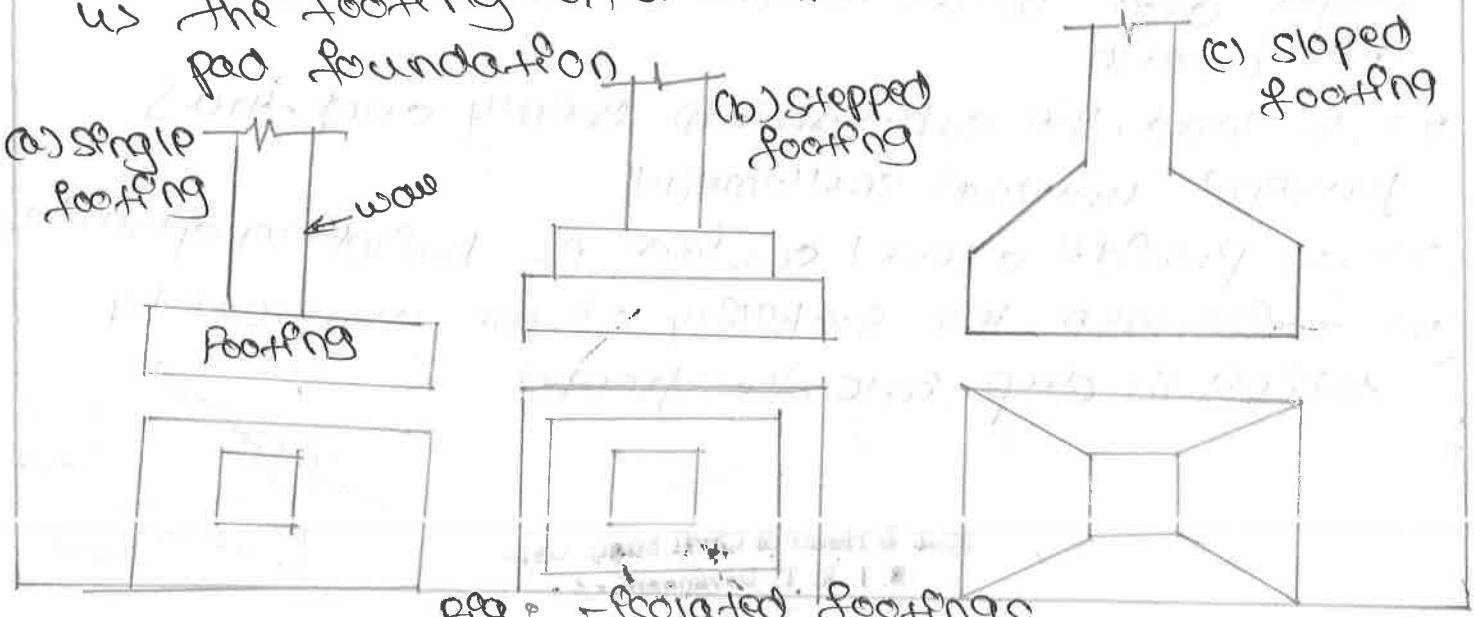


Fig :- Isolated footings

b) Strip / continuous footings

1) Strip footing is another type of spread footing which is provided for a load bearing wall

2) Strip footing than to provide a number of spread footings in one line.

3) Strip footing is also known as continuous footing

4) Strip footings are usually used in the bearing wall type structure

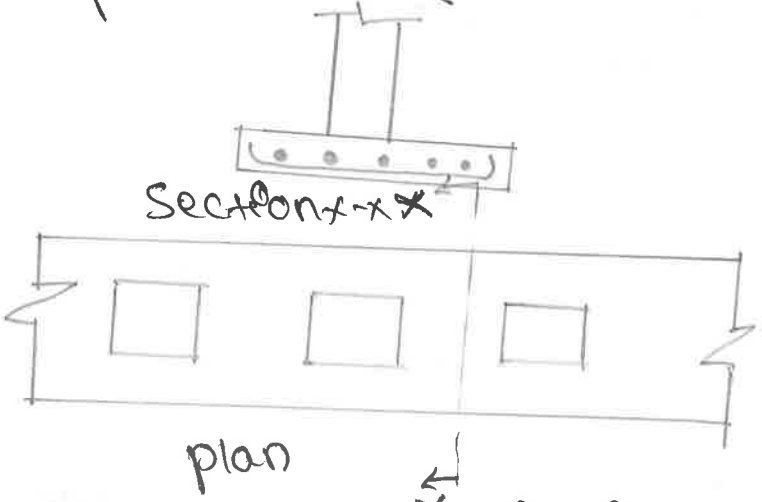


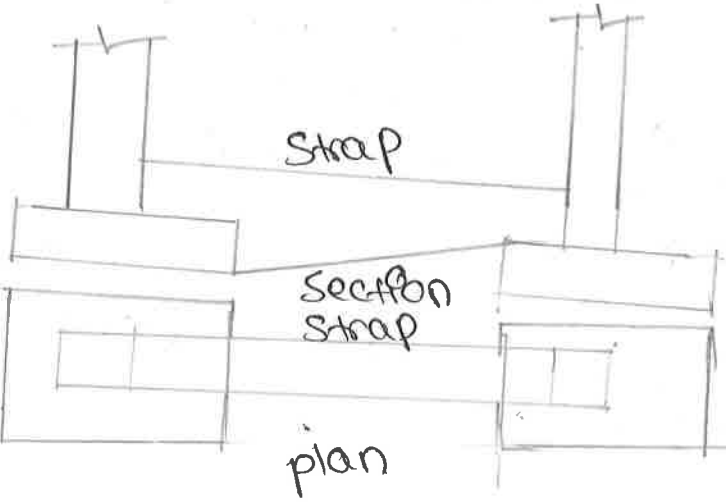
Fig: continuous footings

(ii) Strap footing

1) the two or more footings connected by a beam called strap

2) It is also called as cantilever footing

3) transfer the column loads onto the soil beneath with equal and uniform soil pressure under both. spread footings

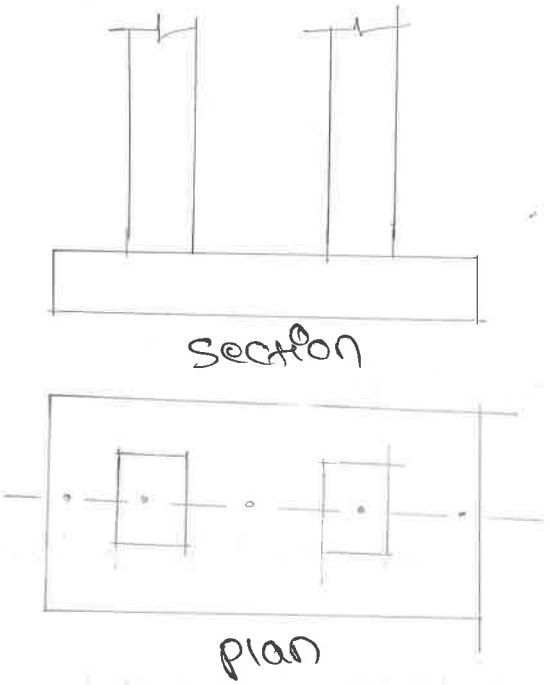


iii) combined footing

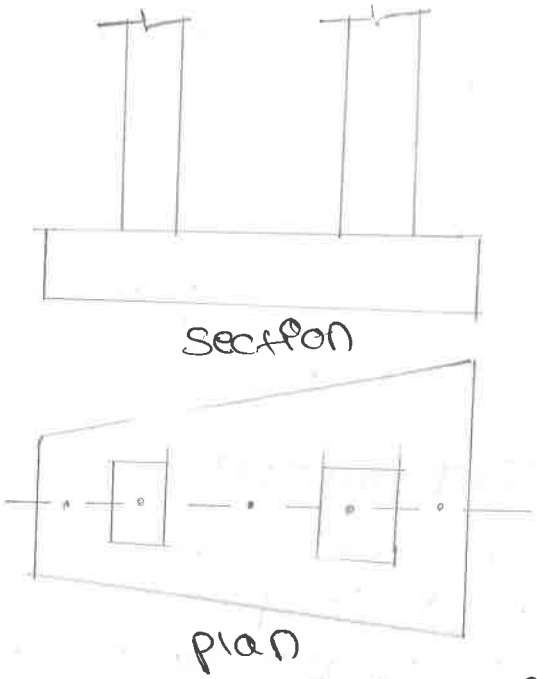
1) a combined footing supports two or more columns in a row as

2) a combined footing is also provided in situations where there is limited space on one side owing to the existence of the boundary line of an adjoining ~~pro~~ private property

3) trapezoidal footing is provided when the load on one of the columns is larger than the other column load



(a) Rectangular combined footing



(b) trapezoidal combined footing

(iv) mat or raft foundation

1) a raft foundation or mat foundation is a large footing supporting walls as well as a number of columns in two or more rows

2) ~~when~~ this is adopted when the allowable soil pressure is low

3) Raft foundation is useful in reducing the differential settlement which may occur on non-homogeneous soil

4) large variation in the loads on individual columns

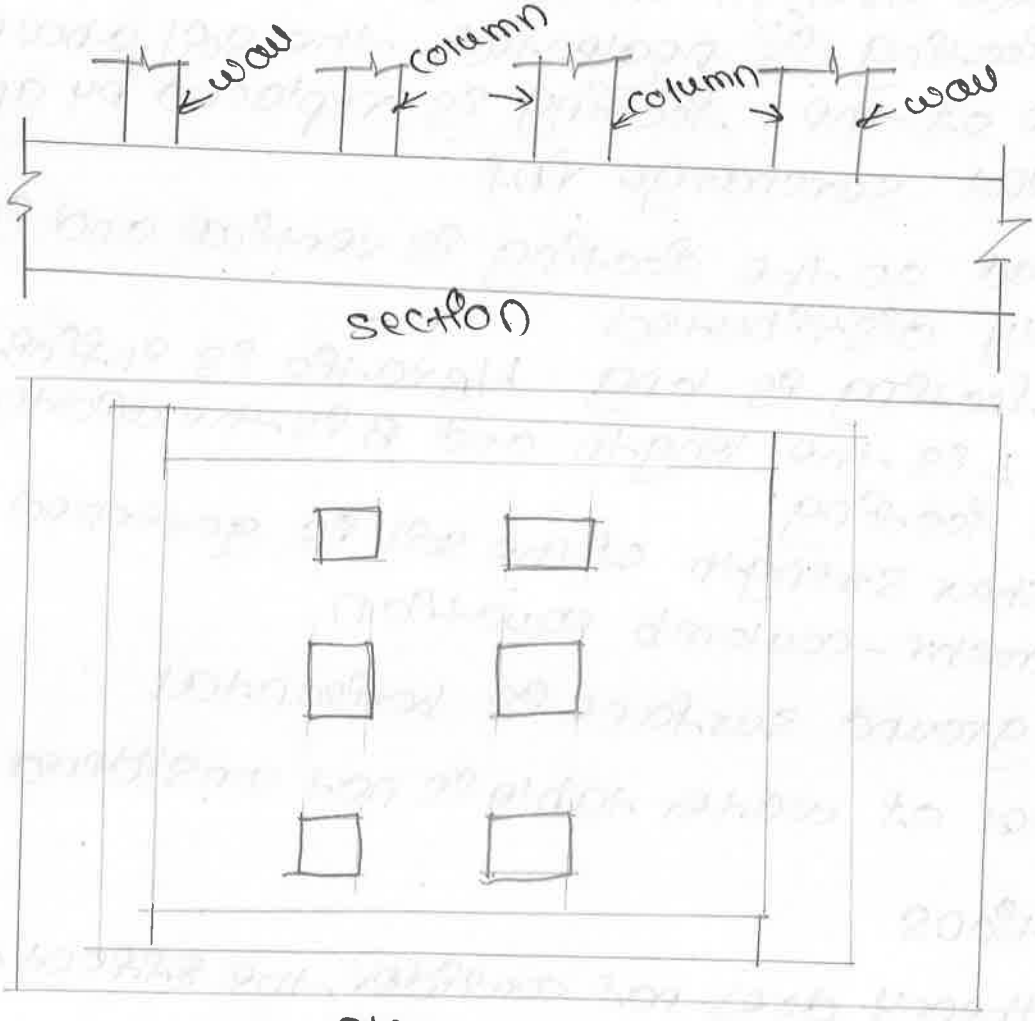


Fig:- Raft or mat foundation

2) Deep foundation
(i) pile foundations
(ii) pier foundations
(iii) well foundations
(iv) caisson foundations

⇒ Imp
Determination of bearing capacity by Terzaghi's assumptions

1) The base of the footing is rough
2) the footing is located at a depth D_f below the ground surface such that D_f is less than or equal to the width B of the footing

$D_f \leq B$, or the foundation is shallow

3) the shear strength of the soil above the base of the footing is neglected. the soil above the base of the footing is replaced by an equivalent surcharge γD_f.

4) the load on the footing is vertical and is uniformly distributed

5) the footing is long L/B ratio is infinite where L is the length and B is the width of the footing

6) the shear strength of the soil is governed by the mohr-coulomb equation

7) the ground surface is horizontal

8) effect of water table is not considered

limitations

1) this theory does not consider the effect of water table on bearing capacity

2) In this theory, effect of depth of the foundation is not considered

3) this theory is applicable to only strip footing and not applicable for others like rectangular square or circular foundation)

4) In this theory, only vertical and symmetrical loading are considered

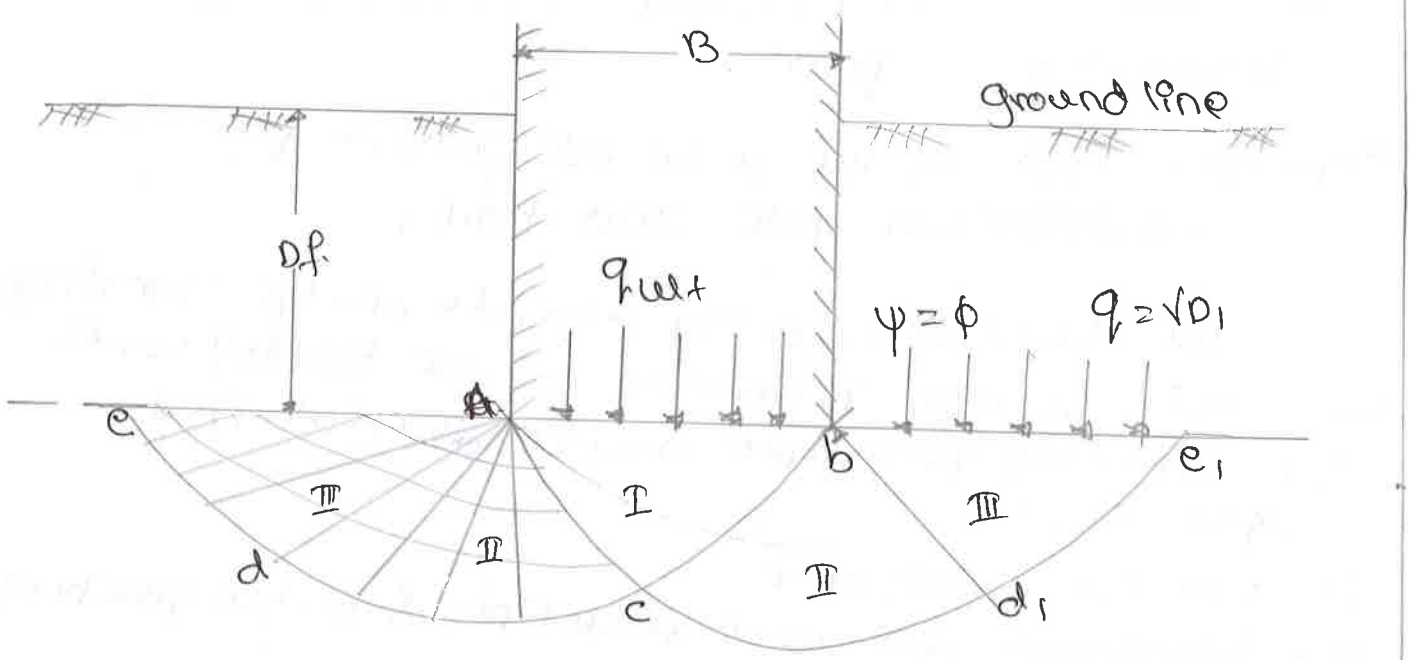


Fig :- Terzaghi's wedge

1> Terzaghi is assumed a strip footing with a rough base placed at the depth Df on a homogeneous and isotropic soil medium

2> the shearing resistance of the soil above the base of the footing is not considered. but the effect of soil - weight abave the base is considered by superimposing an equivalent surcharge intensity, $q = \gamma D_f$. the development of the failure surface in the soil is governed by the general shear failure

Zone I :- 1> The triangular zone Abc immediately below the foundation is an elastic zone and a a zone of active state.

2> It is assumed to move downwards with the footing and in the process produces lateral thrusts which when the soil fails.

3> overcome the passive resistance of the soil along both sides of the footing.

Zone II :- This is the zone of radial shear Adc and bcd. the curves dc and cd. are arcs of a logarithmic spiral

Zone III :- this is the zone of passive plastic equilibrium Ade and bd.e.

The bearing capacity depends on the shearing resistance on the boundary of the failure zones the shearing resistance can be divided into three parts

1> cohesive resistance
2> frictional resistance resulting from the surcharge q at the footing level
3> frictional resistance resulting from the weight of soil within the failure zones

using equilibrium analysis. terzaghi expressed the ultimate bearing capacity on the

$$q_u = cN_c + \gamma D_f N_q + \frac{1}{2}\gamma B N_\gamma \quad \text{(for strip footing)}$$

where

c = unit cohesion
γ = effective unit weight of soil
B = width of footing
D_f = depth of foundation

N_c, N_q and N_γ = the bearing capacity factors that are non dimensional (function of the angle of friction ϕ)

when $\phi = 0$ $N_c = 5.7$ $N_q = 1.0$ and $N_\gamma = 0$

$\therefore q_u = 5.7c + \gamma D_f$.

or $q_u = 5.7c$ for a surface footing

Course Title : Applied Geotechnical Engineering

SUBJECT CODE - 17CV53

SEMESTER - V^th A and B

MODULE - 05

pile foundations

MODULE - 05
pile foundations

Introduction

pile perform the function of transferring load from the superstructure through weak compressible strata or through water onto stiffer or more compact and less compressible soils or onto rock.

They may be required to carry uplift loads when used to support tall structures subjected to overturning forces from winds or waves. pile used in marine structures are subjected to lateral loads from the impact of berthing ships and from waves

combinations of vertical and horizontal loads are carried where piles are used to support retaining walls, bridge piers and abutments and machinery foundations

⇒ necessity of pile foundation

(1) when the upper soil layer is highly compressible and too weak to support the load transmitted by the superstructure

2) piles are used to transmit the load to underlying bedrock or a stronger soil layer

3) pile foundations are required for the transmission of structural loads through deep water to a firm stratum

4) pile foundations are used to resist horizontal forces, additional to support the vertical loads in earth retaining structures and tall structures

and tall structures that are subjected to horizontal force due to high wind and earthquake

5> Expansive soils. such as black cotton soil. which swell or shrink as the water content changes. pile are used to transfer the load below the active zone

⇒ classification of piles

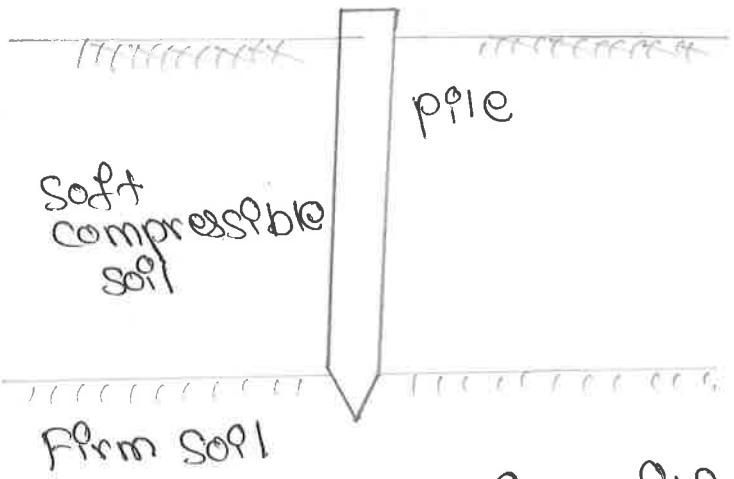
(a) Function or action

2) composition and materials

3> Installation

1> classification based on function or action
a> end bearing pile
b> Friction piles
b> Tension or uplift piles
d> compaction piles
d> anchor piles
e> Fender piles
g> Sheet piles
h> Batter piles
i> laterally loaded piles

a> ~~Friction piles~~ End bearing piles
1> Super-structure and transmitting the load down to the level at which it can be safely borne by the ground
2> The end bearing piles transmit the load of the structure to underlying hard soil
3> transfer load through the pile up to a suitable stratum. passing soft soil or water



Fig(a):- End bearing pile

b> Friction piles

1> when the piles are driven through a soft soil and developed their carrying capacity by friction on the sides of the piles. are called friction piles.

2> used to transfer loads to a depth in a frictional material by means of skin friction along the surface area of the pile

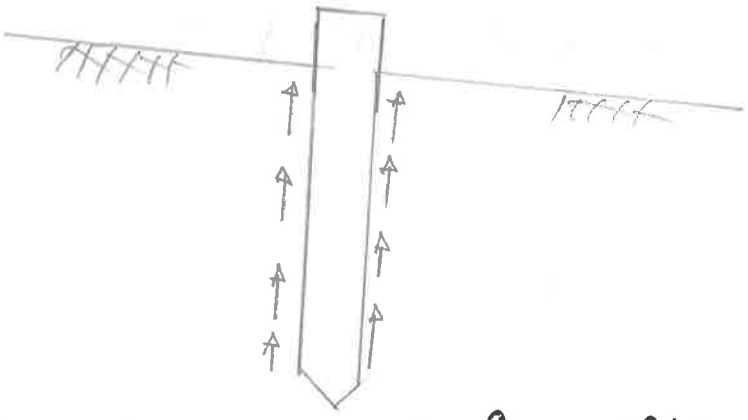


Fig (b) : Friction pile

C> Tension or uplift piles

1> The pile used to resist upward forces and in tension is known as tension pile

2> used to anchors structures subjected to

uplift due to hydrostatic pressure or to overturning moment due to horizontal forces

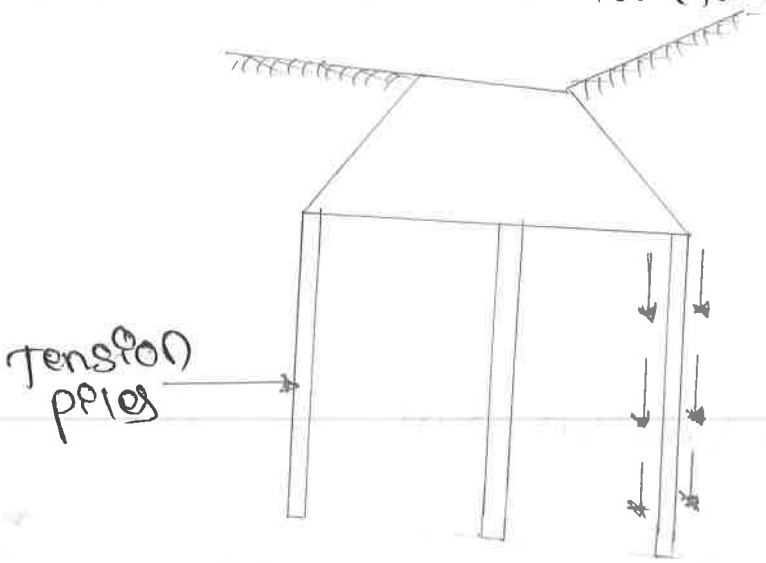


Fig (c) :- Tension piles

d) Compaction piles

1) The piles driven in granular soils with the aim of increasing the bearing capacity of the soil are known as compaction piles

2) Sand may be used to form the pile.

3) The pile tube driven to compact the soil is gradually taken out and sand is filled in its place thus forming a sand pile

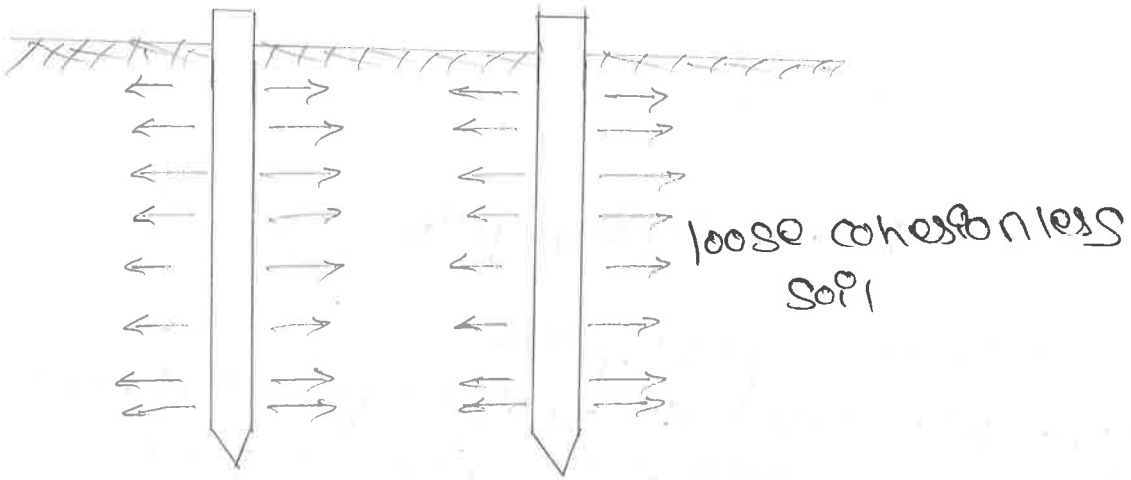


Fig (d) :- compaction pile

e) Anchor piles

1) The piles used for providing anchorage against horizontal pull from sheet piling walls or other pulling forces are known as anchor piles

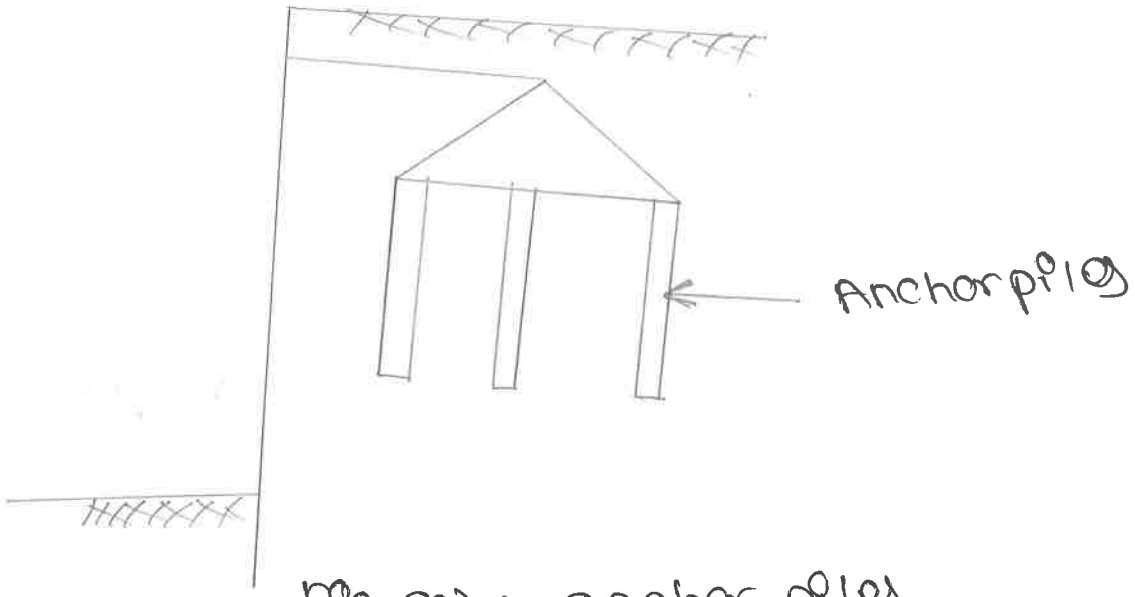


Fig (e) :- anchor piles

f) Render piles

1) The piles used to protect concrete deck or other water front structure from impact. may be caused ships or other floating objects is called Render piles

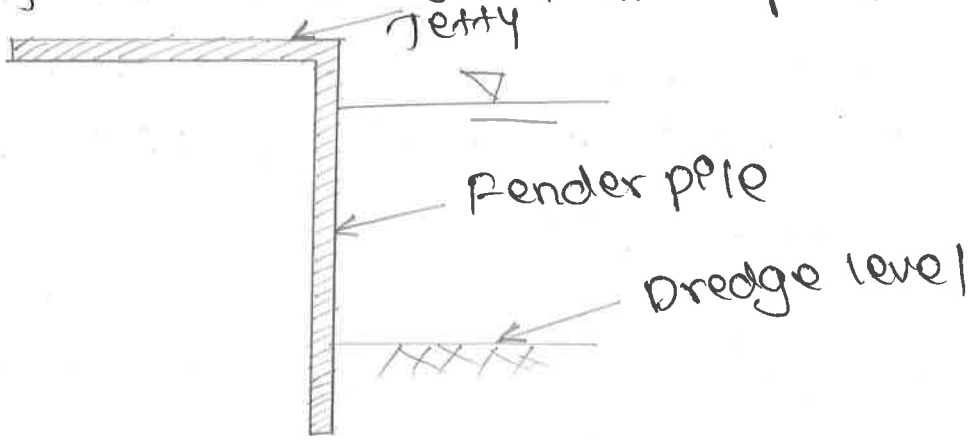


Fig f) :- Render piles

g) Sheet piles

1) used to retain soil that to escape laterally when subjected to pressure to enclose

the area required for same foundation and protect it from the action of running water

2> commonly used as bulkheads, or cut-offs to reduce seepage and uplift in hydraulic structures

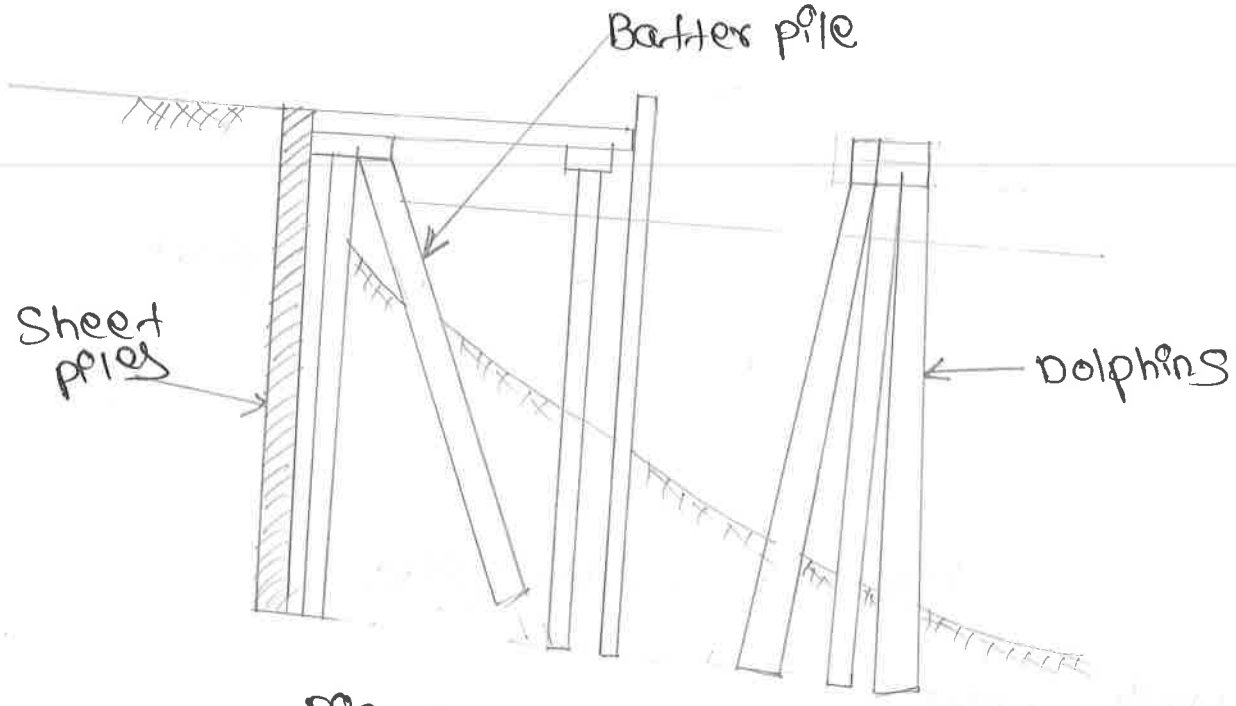


Fig 9:- Sheet piles

h> Batter piles

1>The piles driven at an inclination and have been found to resist the large the horizontal or inclined forces are known as batter piles

2> used to resist horizontal and inclined forces. especially in water front structures

i> laterally- loaded piles

used to support retaining walls, bridges, dams, and wharves and as fenders for harbor construction.

2> classification Based on material and composition

a> Timber piles
b> Steel piles
c> Concrete piles
d> composite piles
e> plastic piles

a> Timber piles

These are made of timber of sound quality. length may be up to abou 8 m. Splicing is adopted for greater lengths. Diameter may be from 30 to 40 cm.

1> Timber piles perform well either in fully dry condition or submerged condition.
2> alternate wet and dry conditions reduce the life of a timber pile.
3> this adopted. maximum design load is about 250 kN.

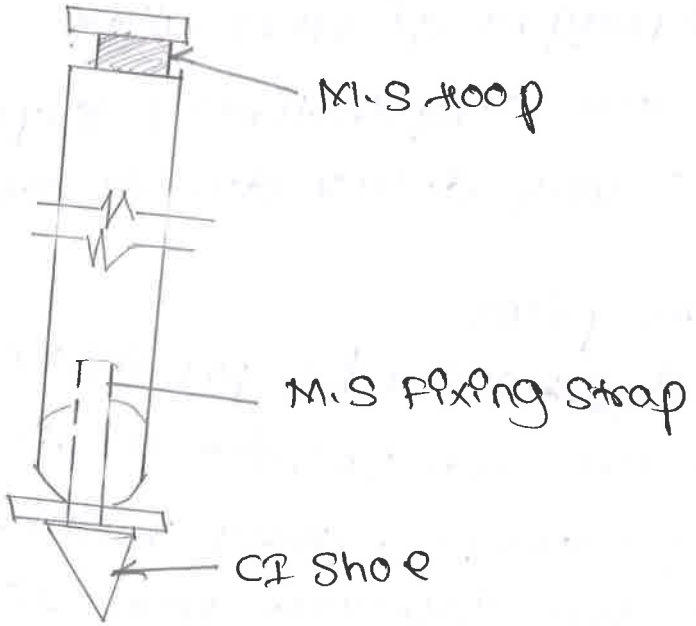


Fig (a): timber piles with M.S hoop and CI Shoe

b> Steel piles

1> Steel piles have been used for supporting heavy loads

2> It is used only in bearing

3> Steel piles require heavy hammers for driving

4> used to withstand large impact stresses and where disturbance from driving is desired

5> also used in open excavations and to provide seepage barrier

6> steel piles are likely to be affected by corrosive action and so will require painting

7> usually H-piles, pipe piles, or sheet piles

⇒ advantages of steel piles

1) piles can bear heavy loads

2> piles can be used for very long lengths

3> piles can be driven through hard layers

4> piles are easy to handle and can easily be cut to desire length

⇒ disadvantages of steel piles

1> piles are comparatively expensive

2> piles may decay due to corrosion

c> Concrete piles

These may be precast or cast in-situ

precast piles are reinforced to withstand handling stress, they require space for casting and storage. more time to cure and heavy equipments for handling and driving

CBCS SCHEME

USN | 4 | B | D | 1 | 7 | C | V | 0 | 3 | 6 | 17CV53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:6403 permitted.

Module-1

1 a. What are the objectives of soil exploration? **(06 Marks)**

b. With a neat sketch, explain seismic refraction method of soil exploration. **(08 Marks)**

c. What is the necessity of dewatering? Explain electro-Osmosis method of dewatering. **(06 Marks)**

OR

2 a. Define the following terms with reference to a sampling tube with a neat sketch:
i) Inside clearance
ii) Outside clearance
iii) Area ratio
iv) Recovery ratio. **(08 Marks)**

b. What is stabilization of bore holes? Explain any one method. **(06 Marks)**

c. List and explain types of soil samples. **(06 Marks)**

Module-2

3 a. Derive the equation for vertical stress below the centre of a circular area with uniform load intensity 'q'. **(08 Marks)**

b. Define Isobar. Construct an Isobar for a vertical stress of $40kN/m^2$, when ground surface is subjected to a concentrated load of 1000kN. **(08 Marks)**

c. Estimate the immediate settlement of a footing of size 2m × 3m resting at a depth of 2m in a sandy soil whose compression modulus is $10N/mm^2$ and the footing is expected to transmit a unit pressure of $160kN/m^2$. Assume $\mu = 0.28$ and $I_f = 1.06$. **(04 Marks)**

OR

4 a. Explain the construction and use of Newmark's chart. **(08 Marks)**

b. Explain contact pressure distribution in soils. **(06 Marks)**

c. A square footing 1.2m × 1.2m rests on a saturated clay layer 4m deep. The soil properties are $W_L = 30\%$, $\gamma_{sat} = 17.8kN/m^3$, $w = 28\%$ and $G = 2.68$. Determine primary consolidation settlement if the footing carries a load of 300kN. **(06 Marks)**

Module-3

5 a. Define with neat sketches at rest, active and passive earth pressures. **(06 Marks)**

b. Explain Culmann's graphical method of finding out the active earth pressure. **(06 Marks)**

c. A retaining wall retains a cohesionless backfill with a height of 7.5m. The top 3m of the backfill has unit weight of $18kN/Nm^3$ and $\phi = 30°$. Lower 4.5m of the backfill has unit weight of $24kN/m^3$ and $\phi = 20°$. Obtain pressure distribution diagram and determine the total active pressure and its point of application. **(08 Marks)**

OR

6 a. Explain Fellinious method of obtaining centre of critical slip surface in the case of stability analysis of C-ϕ soil. **(08 Marks)**

b. Explain the causes for slope failure and also list the type of slope failures. **(06 Marks)**

c. A 5m deep canal has side slopes of 1:1. The properties of soil are $C_u = 20$ kN/m^2, $\phi_u = 10°$, e = 0.80 and G = 2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when the canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number for this condition is 0.137. **(06 Marks)**

Module-4

7 a. Define: Ultimate bearing capacity, net ultimate bearing capacity and safe bearing capacity. **(06 Marks)**

b. Explain plate load test with a neat sketch. **(08 Marks)**

c. A foundation 2.0m square is installed 1.2m below ground level in sandy soil having unit weight of 19.2kN/m^2 above water table and submerged unit weight of 10.1kN/m^3. If C = 0, and $\phi = 30°$, find ultimate bearing capacity when

i) Water table is well below the base of the foundation,

ii) Water table rises to foundation level,

iii) Water table rises to ground level.

Take $N_q = 22$ and $N_\gamma = 20$. **(06 Marks)**

OR

8 a. Distinguish between general shear failure and local shear failure. **(06 Marks)**

b. Explain with a neat sketch the effect of ground water table and eccentricity on bearing capacity. **(08 Marks)**

c. How do you conduct SPT? What are the corrections applied to observed 'N' values? **(06 Marks)**

Module-5

9 a. Explain classification of piles based on function. **(06 Marks)**

b. Explain negative skin friction in pile foundation. **(06 Marks)**

c. Design a square pile group to carry 400kN of load in clay with an unconfined compressive strength of 60kN/m^2. The piles are 30cms diameter and 6m long. Adhesion factor may be taken as 0.6. **(08 Marks)**

OR

10 Write short notes on any four of the following:

a. Pile load test

b. Under reamed piles

c. Settlement of piles

d. Efficiency of pile group

e. Group capacity of piles. **(20 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | |

15CV53

Fifth Semester B.E. Degree Examination, June/July 2019
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Use of IS : 6403 is permitted.***

Module-1

1 a. Enumerate the objectives of subsurface exploration. **(04 Marks)**

b. Explain with reference to soil surplus : Area ratio , Inside clearance , Outside clearance and Recovery ratio. **(04 Marks)**

c. Estimate the position of ground water table from the following data :
Depth upto which water is boiled out is 32m. Water raise in the first day : 2.4m , Second day : 2.0m and Third day : 1.6m. **(08 Marks)**

OR

2 a. Distinguish between undisturbed , disturbed and representative soil samples. What are the tests conducted on these samples in the laboratory? **(05 Marks)**

b. Explain 'Seismic refraction method' of soil exploration, with a neat sketch on its mechanism. **(06 Marks)**

c. What is a Bore hole log? List the information recorded in it. **(05 Marks)**

Module-2

3 a. What do you understand by 'Pressure bulb'? Illustrate with a sketch. **(05 Marks)**

b. A circular area 6m is diameter , carries a uniformly distributed load of 10kN/m^2. Plot the variation of vertical stress at depths 2m , 4m and 8m. **(06 Marks)**

c. Explain the principle of 'New – marks chart'. **(05 Marks)**

OR

4 a. What are different types of settlements of footings? Explain. **(04 Marks)**

b. Estimate the immediate settlement of a footing of size 2m × 3m resting at a depth of 1.5m in sandy soil whose compression modulus is 10N/mm^2. Footing is expected to transmit a unit pressure of 200kN/m^2. Poisson's ratio of soil is 0.3 and influence factor for footing is 1.06. **(04 Marks)**

c. A saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300kN/m^2 and load due to new building increases the pressure by 200kN/m^2. The liquid limit of soil is 75% with field water content = 50% and $G_S = 2.7$. Estimate consolidation settlement. **(08 Marks)**

Module-3

5 a. Explain step by step procedure of Culmann's graphical construction for determination of Active pressure. **(04 Marks)**

b. A 4.5m high retaining wall retains a cohesive soil with C = 10kN/m^2 , $\phi = 20^0$ and $\gamma = 16$kN/m^3. Calculate the depth of tension cracks and critical depth. **(04 Marks)**

c. A retaining wall 6.6m high retains a cohesionless soil whose properties are $\phi = 25^0$, G = 2.6 and e = 0.6. The water table is at n depth of 2.1m below GL. Draw the earth pressure diagram and calculate magnitude and position of active earth pressure above the base of the wall. **(08 Marks)**

OR

6 a. What are the causes of slope failure? List and enumerate the types of failures in finite slopes. **(03 Marks)**

b. List and enumerate the types of failures in finite slopes. **(03 Marks)**

c. An embankment 6m high has a slope of 1V : 2H. The soil properties are $C = 5kN/m^2$, $\phi = 30^0$ and $\gamma = 19\ kN/m^3$. A trial slip circle of radius 8.8m and passing thro' the toe has its centre at the same level as the top of embankment. Find the factor of safety by the 'method of slices'. **(10 Marks)**

Module-4

7 a. Define Ultimate bearing capacity , Safe bearing capacity and Allowable bearing pressure. **(03 Marks)**

b. List the assumption made in Terzagh's b.c theory. **(03 Marks)**

c. Determine the safe bearing capacity of a square footing of side 1.8m , located at a depth of 1.5m below GL in a soil having $\gamma = 16.2\ kN/m^3$, $C = 15kN/m^2$ and $\phi = 35^0$. Take $N_c = 57.8$, $N_q = 41.1$ and $N_r = 42.4$ with FS = 3. Assume water tank at great depth, what will be the SBC if WT rises to the base of footing. **(10 Marks)**

OR

8 a. Explain the three modes of shear failure below the footing, with neat sketches. **(04 Marks)**

b. Discuss the effect of size and shape on the bearing capacity of footing on :
i) Sand ii) Clay. **(04 Marks)**

c. Proportion a square footing to carry a load of 900kN from a column 400 × 400mm in section and located at a depth of 1.5m below GL. The soil has $C = 0$, $\phi = 36^0$, $\gamma = 17.5kN/m^3$ above water table and $\gamma_{sat} = 20kN/cm^3$ below water table(WT). The WT is at the base of the footing. Permissible settlement is 25mm , Corrected N – Value = 30. Use a FS = 2. [Use of IS : 6403 is permitted]. No structural design required. **(08 Marks)**

Module-5

9 a. Classify the pile foundations according to material and function, with neat figures. **(04 Marks)**

b. Explain in detail, the principle associated with determination of pile load capacity using static formula. **(04 Marks)**

c. A 12m long, 30mm dia. pile is driven in uniform deposit of sand with $\phi = 40^0$. The W.T is at great depth. The average dry unit weight of sand is $18kN/m^3$. Using Nq = 137, calculate the safe lad capacity of single pile with a FS = 2.5 and angle of wall friction $(\delta) = 30^0$. **(08 Marks)**

OR

10 a. What is meant by efficiency of pile groups? Discuss Feld's rule for its determination. **(04 Marks)**

b. What is Negative friction? Under what situation negative skin friction occurs. **(04 Marks)**

c. Calculate the safe load carrying capacity of a 16 pile group arranged in a square pattern with each pile is of 400mm diameter , 9m length and with a spacing of 1.2m c/c. The soil is 14m deep clay with unconfined strength of $100kN/m^2$, $r = 16kN/m^3$ and $r^1 = 9kN/m^3$ with adhesion factor $(\alpha) = 0.7$. W.T is 1m below GL. Use a FS = 2.5. **(08 Marks)**

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10CV54

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Geotechnical Engineering - I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain three phase system of soil, with a sketch. Differentiate between void ratio and percentage voids. **(06 Marks)**

b. With usual notation show that

$$e = \frac{Gw}{Sr}.$$ **(06 Marks)**

c. Soil sample in its natural state is fully saturated with a water content of 30%. Determine the void ratio, dry unit weight and wet unit weight. Also calculate total weight of water required to fully saturate a soil mass of volume $50m^3$. Take G = 2.60. **(08 Marks)**

2 a. Determine the moisture content of soil sample by Pycnometer method. At what situation this method is preferred? **(07 Marks)**

b. Discuss advantages and limitations of sedimentation analysis. Explain the corrections to be applied to Hydrometer readings. **(07 Marks)**

c. A dry sample of weight 50gms is mixed with distilled water to prepare a suspension of 1000 mℓ for hydrometer analysis. The reading of the hydrometer taken after 5 minutes is 25 and the depth of the centre of the bulb below the water surface when the hydrometer was in the jar was 150mm. The volume of the hydrometer 62mℓ and cross section area of Jar 55 cm^2. Assuming G = 2.68 and $\eta = 1.0 \times 10^{-5}$ g-sec/cm^2. Determine the co-ordinates of the point corresponding to above observation. **(06 Marks)**

3 a. With a neat sketch, explain plasticity chart and describe its use in classifying fine grained soil. **(06 Marks)**

b. Explain with neat sketches, the structure of the following minerals :
i) Kaolinite ii) Montmorillonite. **(06 Marks)**

c. Following are the results obtained from the tests conducted on two soils A and B. Classify them as per IS classification system. Show the salient steps involved. **(08 Marks)**

Soil	LL	PL	% Retained on IS 75 μm Sieve	% Retained on IS 4.75 mm Sieve	Cu	Cc
A	110	50	40	Zero	-	-
B	-	-	97	05	7	2

4 a. State Darcy's Law. With a neat sketch, derive an expression for the co-efficient of permeability of a soil in a falling head permeability test. **(08 Marks)**

b. Explain the factors affecting the permeability of soil. **(06 Marks)**

c. A sample of soil for constant head permeability test yielded the following data :
i) Diameter of sample = 7.6cm.
ii) Length of sample = 20cm.
iii) Head causing the flow = 15cm.
iv) Quantity of water collected in 10min = 150 CC.

Assume G = 2.65 , γ_d = 18kN/m^3.
Determine : i) Co-efficient of Permeability ii) Discharge velocity iii) Seepage Velocity. **(06 Marks)**

PART – B

5 a. Explain Mohr – Coulomb failure theory of soils. Sketch Coulomb failure envelope for pure sand and pure clay. **(06 Marks)**

b. Explain the following terms : i) Sensitivity and Thixotropy of clay.
ii) Total, neutral and effective stresses in soils. **(06 Marks)**

c. Two identical specimens 4cm diameter and 8cm height of partly saturated compacted soil are tested in a triaxial cell under undrained conditions. The first specimen failed at deviator load of 720N under a cell pressure of 100kN/m^2. Second specimen failed at deviator load of 915N under a cell pressure of 200kN/m^2. The increase in the volume of first specimen at failure is 1.2mℓ and shortens by 0.6cm. The increase in the volume of second specimen at failure is 1.6mℓ and shortens by 0.8cm. Determine apparent cohesion and angle of shearing resistance by analytical method. **(08 Marks)**

6 a. Obtain the value of compactive energy imported to the soil during Light compaction and Heavy compaction test. **(04 Marks)**

b. What are the objectives of Compaction? Discuss the factors affecting compaction. **(06 Marks)**

c. Following are the results obtained from a standard compaction test :

Water content, W(%)	13.5	20.2	25	35	45
Bulk unit weight , γ_b kN/m^3	16.3	19.4	18.8	18	17.2

Plot compaction curve and obtain maximum dry unit weight and OMC. Also plot 100% saturation line. Show specimen calculation. G = 2.65. **(10 Marks)**

7 a. Define the following terms : i) Compression index ii) Co-efficient of compressibility iii) Co-efficient of volume compressibility. **(06 Marks)**

b. Explain with a neat sketch, Casagrande's method of obtaining Pre – consolidation pressure. **(06 Marks)**

c. A saturated soil stratum 5m thick lies above an impervious stratum. It has a compression index of 0.25 and co-efficient of Permeability 3.2 × 10^{-3}mm/sec. If void ratio is 1.90 at a normal stress of 0.15N/mm^2. Compute i) void ratio due to increase in stress to 0.2N/mm^2 ii) settlement of soil stratum due to above increase in stress. **(08 Marks)**

8 a. List the merits and demerits of Triaxial shear test over Direct shear test. **(06 Marks)**

b. Explain the determination of co-efficient of consolidation by square root of time fitting method. **(06 Marks)**

c. In a direct shear test on a specimen of clean dry sand a normal stress of 200kN/m^2 was applied and failure occurred at a shear stress of 140kN/m^2. Determine i) Angle of shearing resistance ii) Principal stresses during failure iii) Direction of principal planes with respect to plane to shearing.
Draw a neat sketch of Mohr circle showing the directions of Major and Minor principal planes with reference to shearing. **(08 Marks)**

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Bapuji Educational Association ®
Bapuji Institute of Engineering and Technology, Davangere–577 004
Department of Civil Engineering

USN										

Course/Subject Title	APPLIED GEOTECHNICAL ENGINEERING	Course/Subject Code	15CV53 /17CV53
Semester	V th A & B	Scheme	CBCS – 18
Date	12/09/2019	CIE No.	I
Time	9:00 am – 10:00 am	Max. Marks	30

Course Outcome Statements : After the successful completion of the course, the students will be able to	
CO1	To plan and execute geotechnical site investigation program for different civil engineering projects.
CO2	To plot stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils.
CO3	To compute lateral earth pressure behind the earth retaining structures by different methods.
CO4	To estimate the factor of safety against failure of slopes by different methods.
CO5	To determine the bearing capacity of soil and achieve proficiency in proportioning the shallow isolated and combined footings for uniform bearing pressure.
CO6	To determine the load carrying capacity of single pile and group of piles for different soil conditions.

Note : ANSWER ONE FULL QUESTION FROM EACH PART

Q. No.	Question	Marks	RBT Level	CO
	Part A			
1 a)	**List** the indirect methods of soil exploration & **explain** with neat sketch electrical resistivity method of soil exploration.	7	L2,L3	1
1 b)	A sampling tube has inner diameter of 70 mm & cutting edge diameter of 68 mm, its outside diameter are 72 mm & 74 mm respectively, determine **area ratio, inside clearance, outside clearance** of the sampler this tube is pushed at the bottom of the borehole to a distance of 550 mm with length of sample recorded being 530 mm, find the **recovery ratio**	8	L3,L4	1
	OR			
2 a)	**What** is dewatering? **Write** the objectives of dewatering. **list the methods** of dewatering techniques used in the field, explain any one method with a neat sketch	8	L2, L3	1
2 b)	A seismic refraction study of an area has given the following data Distance from impact point to geophone (m): 15, 30, 60, 90, 120 Time to receive wave (sec): 0.025, 0.05, 0.10, 0.11, 0.12 Determine the seismic velocity for the surface layer & underlying also determine the thickness of upper layer	7	L3,L4	1
	Part B			
3 a)	**List** the semi direct methods of soil exploration & **explain** with neat sketch of wash boring method (write advantages & disadvantages of wash boring method)	8	L1,L2	1
3 b)	Establish the location of ground water in a clayey strata, water in bore was boiled out to a depth of 10.67m below ground surface & rise of water recorded at 24 hours interval h_1=64 cm h_2=57.9 cm & h_3=51.8 cm	7	L3,L4	1
	OR			
4 a)	**What** is soil exploration? **What** are objectives of soil exploration & **explain** direct method of soil exploration (write advantages, disadvantages & limitations	8	L1,L2	1
4 b)	**What** are samples? **List & explain** the types of samples	7	L2,L3	1

RBT (Revised Bloom's Taxonomy) Levels : Cognitive Domain		
L1 : Remembering	L2 : Understanding	L3 : Applying
L4 : Analysing	L5 : Evaluating	L6 : Creating

Course Coordinator
(SHANKRAMMA H)

Coordinator
DQAC

Program Coordinator
(HOD, Civil)

Bapuji Educational Association ®
Bapuji Institute of Engineering and Technology, Davangere–577 004
Department of Civil Engineering

Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	17CV53
Semester	Vth A and B	**CIE No.**	II
Date	12/09/2019	**Max. Marks**	30

Q.	Solution	Marks
1(a)	list the indirect methods of soil exploration 1> sounding or penetration tests 2> Geophysical methods a> Seismic method b> electrical resistivity method	02
	Explanation of soil exploration above keywords	03
	neat sketch of soil exploration	02
	total marks	=07
2(b)	Sol'n Internal diameter of cutting edge $D_1 = 68mm$ External diameter of cutting edge $D_2 = 74mm$ Internal diameter of sampling tube $D_3 = 70mm$ External diameter of sampling tube $D_4 = 72mm$	
	Inside clearance ratio $C_i = \frac{D_3 - D_1}{D_1} \times 100$	02
	$= \frac{70-68}{68} \times 100 = 2.94\%$	
	outside clearance ratio $C_o = \frac{D_2 - D_4}{D_4} \times 100$	02

13/09/19
Course Coordinator
(Faculty in charge)

Coordinator
DQAC

Program Coordinator
(HOD, Civil)

Scheme of Valuation

Q.	Solution	Marks
	$\frac{74-72}{72} \times 100 = 2.78\%$	
	area ratio $A_r = \frac{D_2^2 - D_1^2}{D_1^2} \times 100$	02
	$= \frac{74^2 - 68^2}{68^2} \times 100 = 18.62\%$	
	Recovery ratio $R_r = \frac{L}{H} \times 100$	02
	$= \frac{80}{550} \times 100 = 14.54\%$	
	total marks = 08	
2(a)	definition of dewatering	01
	objective of dewatering	02
	list of method of dewatering techniques	01
	Explain about any one method of dewatering with neat sketch	03
		01
2(b)	Soln total marks = 08.	
	velocity in the upper layer	
	$V_1 = \frac{(60-15)}{[0.10-0.025]} = 600 \text{ m/s}$	1.5
	velocity in the lower layer	
	$V_2 = \frac{(120-60)}{(0.12-0.10)} = 3000 \text{ m/s}$	1.5

13/09/19
Course Coordinator
(Faculty in charge)

Coordinator
DQAC

Program Coordinator
(HOD, Civil)

Bapuji Educational Association ®
Bapuji Institute of Engineering and Technology, Davangere–577 004
Department of Civil Engineering

Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	17CV53
Semester	Vth A and B	**CIE No.** I	CBCS-18
Date	12/09/2019	**Max. Marks**	30

Q.	Solution	Marks
	thickness of upper layer $H_1 = \frac{dc}{2}\sqrt{\frac{(V_2 - V_1)}{(V_2 + V_1)}} = \frac{60}{2}\sqrt{\frac{(3000-600)}{(3000+600)}}$	2.5
	$H_1 = 24.5\ m$	
	For graph	1.5
	total marks =	07
3(a)	list the seven direct methods of soil Exploration 1> Auger boring 2> Auger and shell boring 3> wash boring 4> percussion drilling 5> Rotary drilling	01
	Explain the ~~soil exploration~~ wash boring keywords with neat sketch	03 01
	write advantage and disadvantage about wash boring	03
	total marks =	08
3(b)	Soln $H_0 = \frac{h_1^2}{h_1 - h_2} = \frac{0.64^2}{0.64 - 0.579} = 6.71\ m$	01

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Scheme of Valuation

Q.	Solution	Marks
	$H_2 = \frac{h_2^2}{h_1 - h_2} = \frac{0.579^2}{0.64 - 0.579} = 5.495$ m	01
	$H_3 = \frac{h_3^2}{h_2 - h_3} = \frac{0.518^2}{0.579 - 0.518} = 4.398$ m	01
	$hw_1 = 10.67 - H_0 = 3.956$ m	
	$hw_2 = 10.67 - (h_1 + h_2) - H_2 = 3.956$ m	01
	$hw_3 = 10.67 - (h_1 + h_2 + h_3) - H_3 = 4.53$ m	01
	Depth of c.w.t. $hw = \frac{hw_1 + hw_2 + hw_3}{3}$	01
	$= \frac{3.956 + 3.956 + 4.53}{3}$	1.5
	$\therefore hw = 4.148$ m	01
	total marks	= 07

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engg	**Course/Subject Code**	17CV53
Semester	Vth A and B	**CIE No.**	1
Date	12/09/2019	**Max. Marks**	30

Q.	Solution	Marks
4(a)	Define Soil Exploration	01
	write the objectives of Soil Exploration	02
	Explanation about direct method of Soil Exploration	03
	mention the advantages and disadvantages and limitations of direct methods	02
		08
4(b)	Definition of Samples,	01
	list and Explanation about keywords of Samples	02
	and Explanation ~~of~~ types of Samples	04
		07.

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Scheme of Valuation

Q.	Solution	Marks

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Course/Subject Title	APPLIED GEOTECHNICAL ENGINEERING	Course/Subject Code	15CV53 /17CV53
Semester	V th A & B	Scheme	CBCS – 18
Date	22/10/2019	CIE No.	II
Time	9:00 am – 10:00 am	Max. Marks	30

Course Outcome Statements : After the successful completion of the course, the students will be able to	
CO1	To plan and execute geotechnical site investigation program for different civil engineering projects.
CO2	To plot stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils.
CO3	To compute lateral earth pressure behind the earth retaining structures by different methods.
CO4	To estimate the factor of safety against failure of slopes by different methods.
CO5	To determine the bearing capacity of soil and achieve proficiency in proportioning the shallow isolated and combined footings for uniform bearing pressure.
CO6	To determine the load carrying capacity of single pile and group of piles for different soil conditions.

Note : Note : Answer one Full Question From Each Part

Q. No.	Question	Marks	RBT Level	CO
	Part A			
1 a)	**Drive** the expression for vertical stress and shear by using Boussinesq's theory. Also write expression for Westerguard's theory.	8	L2,L3	2
1 b)	**What** is New mark's influence chat & also **describe** construction procedure for New mark's influence chat.	7	L1,L2	2
	OR			
2 a)	**What** are the type of settlement? Explain them with equations.	7	L1,L2	2
2 b)	A soft, normally consolidated clay layer 18 m thick. The natural water content. Saturated unit weights specific gravity & liquid limit are 45%, 18 kN/m^3,2.70 & 63% respectively. The vertical stress increment at centre of the layer due to the foundation load is 9 kN/m^2. The ground water level is at the surface of the clay layer. **Determine the settlement of the foundation.**	8	L4,L5	2
	Part B			
3 a)	**Explain** the i) stress Isobar or pressure bulb ii) uniformly load rectangular area iii) Equivalent point load method	8	L1,L2	2
3 b)	A concentrated load of 300 kN acts on the surface of a homogeneous soil mass of large extent. **Find the stress intensity at a depth of 10 m** i) directly under the load. ii) at a horizontal distance 7.5 m. use Boussinesq's equation.	7	L4,L5	2
	OR			
4 a)	Generalize the **assumptions made by Terzagh's** bearing capacity theory for development of bearing capacity equation? Also write equation of square footing, rectangular footing, circular footing.	7	L1,L2	5
4 b)	**What will be the net ultimate bearing capacity of sand** having $\phi=36^0$ & $\Upsilon=19kN/m^2$ for (i) 1.5m strip foundation & (ii) 1.5m×1.5m square footing . the footing are placed at a depth 1.5m below ground level. Assume F.S=3. **Use Terzaghi's equations**	8	L4,L5	5

ϕ	N_c	N_q	N_Υ
35^0	57.8	41.4	42.4
40^0	95.7	81.3	100.4

RBT (Revised Bloom's Taxonomy) Levels : Cognitive Domain		
L1 : Remembering	L2 : Understanding	L3 : Applying
L4 : Analysing	L5 : Evaluating	L6 : Creating

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	17 CVS 3
Semester	IVth A and B	**CIE No.**	II / CBCS-18
Date	22/10/2019	**Max. Marks**	30

Q.	Solution	Marks
1(a)	Solve the Boussinesq's theory and write only Expression of westerguard's theory	06 02 08
1(b)	Draw the new mark's influence chat. and write construction procedure and keywords of new marks Influenco chat. total marks =	03 04 07
2(a)	write the types of settlement. Explanation of each types with Expression (1) immediate settlement (2) primary consolidation settlement. (3) Secondary consolidation settlement total marks =	02 05 07.
2(b)	Soln $\sigma_0 = \sqrt{z}/2 = 18$	

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Q.	Solution	Marks
	$\gamma' = (\gamma_{sat} - \gamma_w) = 18 - 9.81 = 8.19\ kN/m^3$	01
	$\sigma_0 = 8.19 \times \frac{1}{2} \times 18 = 73.71\ kN/m^2$	1.5
	$e_0 = w\, G_1 = 0.45 \times 2.70 = 1.22$	1.5
	Consolidation Settlement $S_c = \frac{C_c}{1+e_0} H \log_{10}\left[\frac{\sigma_0 + \Delta\sigma}{\sigma_0}\right]$	
	Compression index $C_c = 0.009\,(w_L - 10)$	
	$w_L = 63\%$	
	$C_c = 0.009\,(63-10) = 0.477$	02
	$S_c = \frac{0.477}{1+1.22} \times 18 \log_{10}\left[\frac{73.71+9}{73.71}\right]$	02
	$S_c = 0.19\,m = 19\,mm$	
	total marks = 08.	
3(a)	Explanation(s) of Stress isobar or pressure bulb with neat sketch and expression	03
	(i) uniformly load rectangular area with neat sketch and expression	2.5
	(ii) equivalent point load method with neat sketch and expression	2.5
	total = 08. marks	

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	17CV53
Semester	7th A and B	**CIE No.** II	CBCS-18
Date	22/10/19	**Max. Marks**	30

Q.	Solution	Marks
3(b)	Sol/2 according to Boussinesq's theory $\sigma_z = \frac{3Q}{2\pi z^2} \frac{1}{\left[1+\left(\frac{r}{z}\right)^2\right]^{5/2}}$ (i) Directly under the load $r = 0 \quad z = 10\ m \quad \frac{r}{z} = 0$ $Q = 3000\ kN$ $\sigma_z = \frac{3000 \times 3}{2\pi \times 10^2} \times \frac{1}{(1+0)^{5/2}}$ $\sigma_z = 14.32\ kN/m^2$ (ii) at a horizontal distance of 6m $r = 7.5\ m \quad z = 10\ m \quad \frac{r}{z} = \frac{7.5}{10} = 0.75\ m$ $\sigma_z = \frac{3 \times 3000}{2\pi \times 7.5^2} \times \frac{1}{[1+(0.75)^2]}$ $\sigma_z = 4.69\ kN/m^2$ total 07 marks	3.5 3.5

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Scheme of Valuation

Q.	Solution	Marks
4(a)	Draw with neat sketch of Terzaghi's bearing capacity theory and write the assumptions which made by terzaghi's with strip footing formula	01
	$q_u = cN_c + \gamma D_f N_q + \frac{1}{2}\gamma B N_\gamma$ (strip footing)	03
	c = unit cohesion γ = Effective unit weight of soil B = width of footing D_f = depth of foundation N_c, N_q, N_γ = bearing capacity factors	
	also write the formula of following square footing	01
	rectangular footing	01
	circular footing	01
	total marks	=07
4(b)	soil $\phi = 36°$	
	$N_c = 95.7 - \frac{(95.7-5.78)}{(40-35)} \times (40-36°)$	02
	$= 65.38$	
	$N_q = 81.3 - \frac{(81.3-41.4)}{(40-35)} \times (40-36°)$	

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	17CV53
Semester	5th A and B	**CIE No.**	II CBCS-18
Date	22/10/2019	**Max. Marks**	30

Q.	Solution	Marks
	$N_q = 49.38$ $N_r = 100.4 \quad \frac{(100.4 - 42.4)}{(40^\circ - 35^\circ)} \times (40 - 36^\circ)$ $= 54$ (i) for strip footing $q_u = cN_c + \gamma D_f N_q + 0.5 \gamma B N_r$ $C = 0$ $= 0 + 19 \times 1.5 \times 49.38 + 0.5 \times 19 \times 1.5 \times 54$ $= 0 + 1407.33 + 769.5$ $q_u = 2176.83 \text{ kN/m}^2$ net ultimate bearing capacity $q_{nu} = q_u - \gamma D_f$ $= 2176.83 - 19 \times 1.5$ $q_{nu} = 2148.33 \text{ kN/m}^2$ (ii) Square footing $q_u = 1.3cN_c + \gamma D_f N_q + 0.4 \gamma B N_r$	03

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Q.	Solution	Marks
	$= 0 + 19 \times 1.5 \times 49.38 + 0.4 \times 19 \times 1.5 \times 54$	
	$= 0 + 1407.33 + 615.6$	
	$q_u = 2022.93$ kN/m2	
	net ultimate bearing capacity	03
	$q_{nu} = q_u - \gamma D_f$	
	$= 2022.93 - 19 \times 1.5$	
	$q_{nu} = 1994.43$ kN/m2	
	total marks =	08

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Course/Subject Title	APPLIED GEOTECHNICAL ENGINEERING	Course/Subject Code	15CV53 /17CV53
Semester	V th A & B	Scheme	CBCS – 18
Date	26/11/2019	CIE No.	III
Time	9:00 am – 10:00 am	Max. Marks	30

Course Outcome Statements : After the successful completion of the course, the students will be able to	
CO1	To plan and execute geotechnical site investigation program for different civil engineering projects.
CO2	To plot stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils.
CO3	To compute lateral earth pressure behind the earth retaining structures by different methods.
CO4	To estimate the factor of safety against failure of slopes by different methods.
CO5	To determine the bearing capacity of soil and achieve proficiency in proportioning the shallow isolated and combined footings for uniform bearing pressure.
CO6	To determine the load carrying capacity of single pile and group of piles for different soil conditions.

Note : Answer one Full Question From Each Part

Q. No.	Question	Marks	RBT Level	CO
	Part A			
1 a)	**Define** with **neat** sketch At rest, Active & Passive earth pressure.	7	L1,L2	3
1 b)	A 6m high retaining wall retains sand in following states (i)Loose state e=0.60 & $\phi=30^0$, (ii) Dense state e=0.40 & $\phi=42^0$ **Determine** the active & passive earth pressure in two cases. Also compare the ratio of active & passive earth pressure. Take G=2.67	8	L2,L3	3
	OR			
2 a)	**Explain** Rankine's theory for **calculating** active earth pressure for cohesive backfill & also write critical depth of excavated in clay.	8	L1, L2	3
2 b)	A retaining wall of 5m height & having a smooth vertical back has retains a clay backfill having the following properties.. C=10 kN/m^2, $\phi=20^0$, γ=16.8 kN/m^3. It is expected that tension cracks may be develop to the full theoretical depth, **calculate the total active earth force acting on the wall.**	7	L2,L3	3
	Part B			
3 a)	**Classify** the various type of piles based on materials & function.	8	L1,L2	6
3 b)	A concrete pile 300mm diameter is driven into a homogeneous consolidated clay deposit (unit cohesion C_u=40 kN/m^2 &adhesion factor α=0.7). if the embedded length is 10m, **calculate the safe load**. take factor of safety F.S =2.5.	7	L2,L3	6
	OR			
4 a)	**Wirte note on** (i) Negative skin friction (ii) construction & working of under reamed piles.	8	L1,L2	6
4 b)	A square group of 9 piles was driven into soft clay extending to large depth. The diameter & length of the piles were 350mm & 10m respectively.if the unconfined compression strength of the clay is 90 kN/m^2, & pile spacing is 1.1m centre to centre, **what is the capacity of the group ?** Assume a factor of safety of (F.S) 2.5 and adhesion factor of α =0.75.	7	L2,L3	6

RBT (Revised Bloom's Taxonomy) Levels : Cognitive Domain		
L1 : Remembering	L2 : Understanding	L3 : Applying
L4 : Analysing	L5 : Evaluating	L6 : Creating

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	15CV53 / 17CV53
Semester	Vth A and B	**CIE No.**	III
Date	26/11/2019	**Max. Marks**	30.

Q.	Solution	Marks
1(a)	define the each terms with neat sketch. earth pressure at rest. active earth pressure passive earth pressure total marks 07.	2 2.5 2.5
1(b)	Soln (i) loose state $\gamma_d = \frac{e\gamma_w}{1+e} = 16.37\ kN/m^3$ $k_a = \frac{1-\sin\phi}{1+\sin\phi} = 0.33$ active earth pressure at depth 6 m $P_a = k_a \sqrt{H} = 32.41\ kN/m^2$ $k_p = \frac{1+\sin\phi}{1-\sin\phi} = 3.$ passive earth pressure at depth 6m $P_a = k_p \sqrt{H} = 294.66\ kN/m^2$ (ii) dense state $\gamma_d = \frac{e\gamma_w}{1+e} = 18.7\ kN/m^3$ $k_a = \frac{1-\sin\phi}{1+\sin\phi} = 0.198$	01 01 01 01

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Q.	Solution	Marks
	active earth pressure at depth 6m $P_a = K_a \gamma H = 22.21 \text{ kN/m}^2$	01
	$K_p = \frac{1+\sin\phi}{1-\sin\phi} = 5.04$ passive earth pressure at depth 6 m $P_p = K_p \gamma H = 565.48 \text{ kN/m}^2$	01
	Ratio of active pressure on the dense state to loose state $= \frac{22.21}{32.4} = 0.685$	01
	Ratio of ~~passive~~ passive pressure on the dense to loose state $= \frac{565.48}{294.66} = 1.91$ total marks =	01 08
2(a)	drive expression of Rankine's theory for cohesive backfill and also write equation of critical depth total marks =	01 04 08
2(b)	Soln $K_a = \frac{1-\sin\phi}{1+\sin\phi} = 0.49$ depth of tension crack $Z_o = 2c/\gamma\sqrt{K_a} = 1.7 \text{ m}$	01

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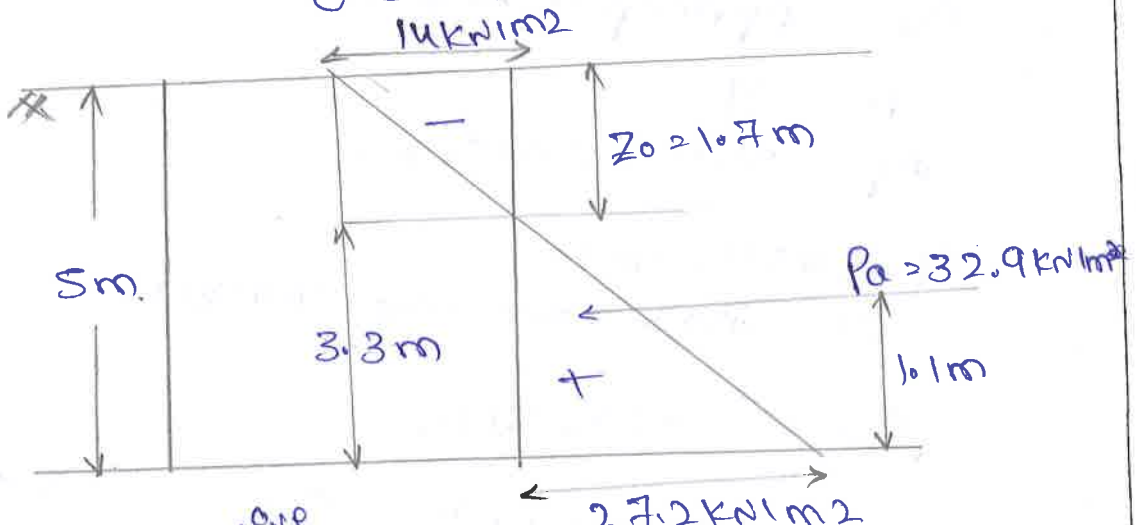
Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	15CV53 / 17CV53
Semester	7th A and B	**CIE No.**	II
Date	26/11/2019	**Max. Marks**	30

Q.	Solution	Marks
	active earth pressure $P_a = \gamma z k_a - 2c\sqrt{k_a}$ $= 8.24z - 14$	01
	at $z = 2$ m $P_a = -14$ kN/m2	01
	at $z = 5$ m $P_a = 27.2$ kN/m2	01
	draw the earth pressure distribution diagram 	02
	total active earth pressure acting on permeter length of wall $P_a = \frac{1}{2}\gamma k_a H^2 - 2c\sqrt{k_a} \times H$ $= 32.9$ kN/m2	01

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Scheme of Valuation

Q.	Solution	Marks
	$Pa = \frac{1}{2}[27.2 \times 3.3 - 14 \times 1.7]$	
	$Pa = 32.98\ KN/m^2$ total marks =	07.
3(a)	write the type of piles based on materials with each explains	04
	and based on function	04
	total marks =	08.
3(b)	Soln	
	$Qu = Qup + Qus$	
	$Qu = ApNcCp + \alpha CAs$	01
	$Nc = 9$	
	$Ap = \frac{\pi d^2}{4} = 0.0706\ m^2$	01
	$Cp = 40\ KN/m^2$	
	$As = \pi dL = \pi \times 0.3 \times 10 = 9.42\ m^2$	01
	$Qu = 289.17\ KN$	02
	safe allowable load $= \frac{Qu}{F.S} = \frac{289.17}{2.5}$	02
	$= 115.66\ KN.$	
	total marks =	07.

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Scheme of Valuation

Course/Subject Title	Applied Geotechnical Engineering	**Course/Subject Code**	15CV53/17CV53
Semester	Vth A and B	**CIE No.**	III
Date	26/11/2019	**Max. Marks**	30

Q.	Solution	Marks
4(a)	write about the (i) Negative skin friction with neat sketch and (ii) construction and working of under reamed piles	04 04
	total marks =	08
4(b)	SOLN $m = n = 3 \quad B_g = L_g$ width of group $B_g = (n-1)\times S + d$ $= 2.55\ m$	01
	Cohesion $c_p = c = \frac{90}{2} = 45\ kN/m^2$	
	Block failure $Q_{ug} = c_p A_g N_c + c_p g L$	01
	$A_g = L_g \times B_g = 2.5 \times 2.5 = 6.50\ m^2$	01
	$N_c = 9$	
	$P_g = 2(B_g + L_g) = 10.2\ m$	01
	$Q_{ug} = 7222.5\ kN$	01
	for piles acting individually $A_p = \frac{\pi d^2}{4} = 0.096\ m^2$	0.5

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Scheme of Valuation

Q.	Solution	Marks
	$AS = \pi dL = 11 m^2$	0.5
	$Qu = \eta c p A_p N_c + \eta \alpha c A_S$	01
	$Qu = 3691.17 kN$	
	Safe allowable load $= \frac{Qu}{F.S}$	01
	$= \frac{3691.17}{2.5}$	
	$= 1476.46 kN$	
	total marks =	07.

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Assignment

USN										

Subject Title	APPLIED GEOTECHNICAL ENGINEERING	Subject Code	15CV53/17CV53
Semester	V Sem A section & B section	Scheme	CBCS
Starting Date	24/10/2019	Assignment number	I
Last Date	09/112019	Max. Marks	10

Course Outcome Statements : After the successful completion of the course, the students will be able to	
CO1	To plan and execute geotechnical site investigation program for different civil engineering projects.
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CO3	To compute lateral earth pressure behind the earth retaining structures by different methods.
CO4	To estimate the factor of safety against failure of slopes by different methods.
CO5	To determine the bearing capacity of soil and achieve proficiency in proportioning the shallow isolated and combined footings for uniform bearing pressure.
CO6	To determine the load carrying capacity of single pile and group of piles for different soil conditions.

Note: Answer all the above Questions.

Q. No.	Question	Marks	RBT Level	CO
1	Compare coulomb's earth pressure theory over Rankin's Earth pressure theory.	2	L2, L3	CO1
2	Determine the active earth pressure using Rebhann's & culmann's graphical method.		L2, L3	CO1
3	Define with neat sketch Earth pressure at Rest, Active & passive Earth pressure.	2	L2, L3	CO1
4	Define Finite slope. What are the causes for slope failure & also list various types of slope failures with sketches.	2	L2, L3	CO1
5	Explain the procedure for determination of factor of safety using method of slices for C-ϕ soil.	2	L2, L3	CO1
6	Explain Swedish method of slices of stability analysis of slopes.	2	L2, L3	CO1
7	A retaining wall 8m high with a smooth vertical back, retains a clay backfill with C=15 kN/m^2, ϕ=15^0 & Υ=18 kN/m^2. Calculate the total active thrust on the wall assuming that tension cracks may developed to the theoretical depth.	2	L3,L4	CO1
8	A 7m deep canal has side slope of 1:1. The properties of soil are C_u=20 kN/m^2, ϕ_u=15^0 e=0.9 & G=2.75. if Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number number for this condition is 0.137	2	L3,L4	CO1
9	An embankment is inclined at an angle of 35^0 & its height is 15m. the angle of shearing resistance is 15^0 & cohesion intercept is 40 kN/m^2. The unit weight of soil is 18 kN/m^2. Find the factor of safety with respect to cohesion. Consider Taylor's stability number as 0.06.	2	L3, L4	CO1
10	A retaining wall with a smooth vertical back is 6m high & retains cohesion less soil with a bulk unit weight of 18 kN/m^3 & ϕ=30^0. The top of the soil is level with the top of the wall & is horizontal. If the soil surface carries a uniformly distributed load of 5 kN/m^2. Determine using Rankine's theory, the total active earth thrust & draw the active pressure distribution diagram.	2	L3, L4	CO1

RBT (Revised Bloom's Taxonomy) Levels		
L1 : Remembering	L2 : Understanding	L3 : Applying
L4 : Analysing	L5 : Evaluating	L6 : Creating

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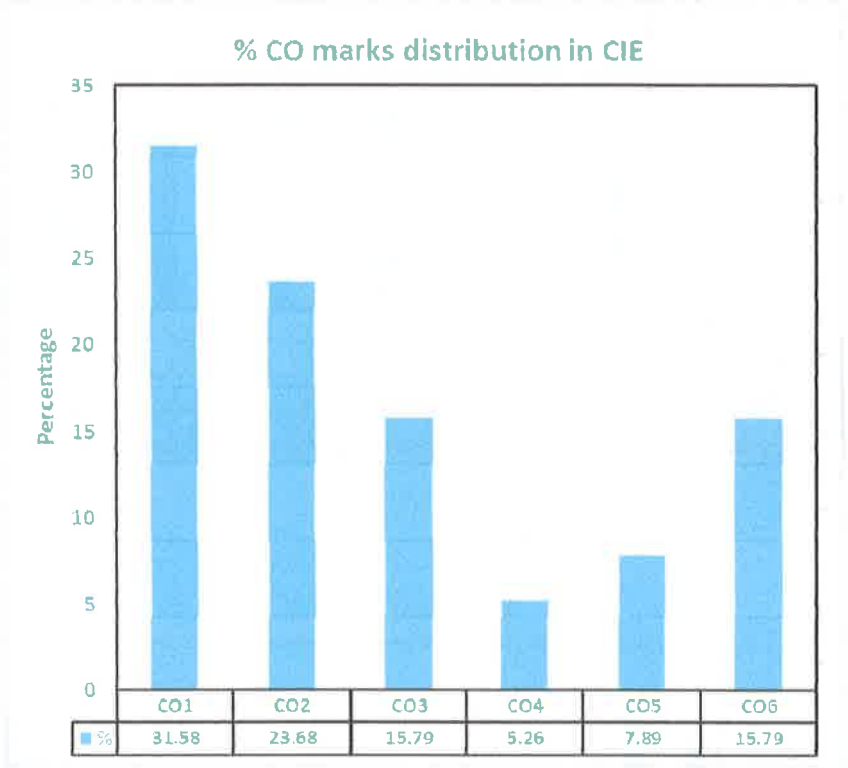
Subject Title	APPLIED GEOTECHNICAL ENGINEERING	Subject Code	15CV53/17CV53
Semester	V Sem A section & B section	Scheme	CBCS
Starting Date	24/10/2019	Assignment number	I
Last Date	09/112019	Max. Marks	10

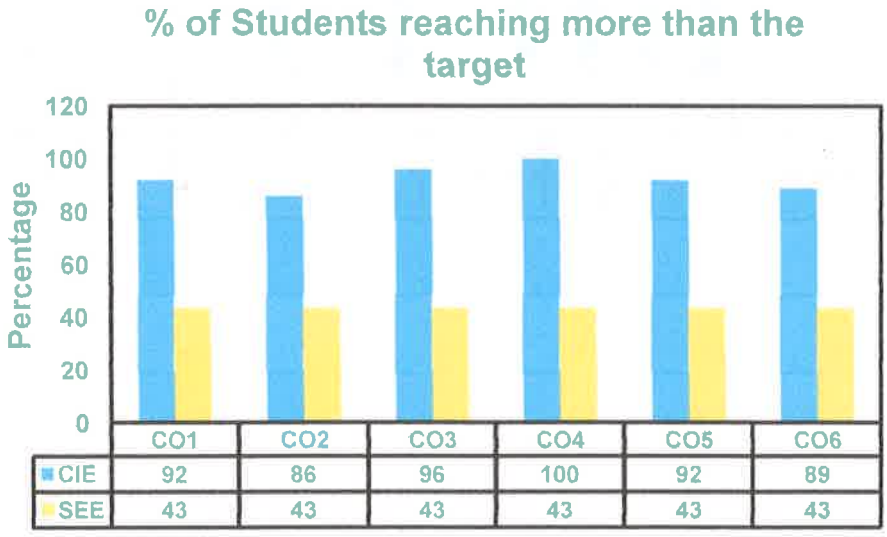
Course Outcome Statements : After the successful completion of the course, the students will be able to	
CO1	To plan and execute geotechnical site investigation program for different civil engineering projects.
CO2	To plot stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils.
CO3	To compute lateral earth pressure behind the earth retaining structures by different methods.
CO4	To estimate the factor of safety against failure of slopes by different methods.
CO5	To determine the bearing capacity of soil and achieve proficiency in proportioning the shallow isolated and combined footings for uniform bearing pressure.
CO6	To determine the load carrying capacity of single pile and group of piles for different soil conditions.

Note: Answer all the above Questions.

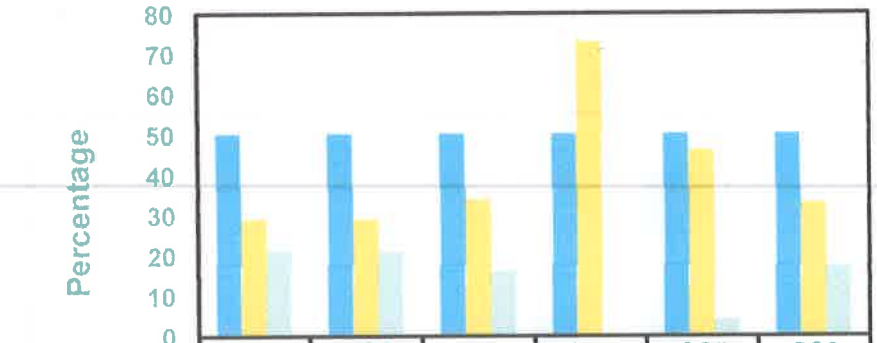
Q. No.	Question	Marks	RBT Level	CO
1	Compare coulomb's earth pressure theory over Rankin's Earth pressure theory.	2	L2, L3	CO3
2	Determine the active earth pressure using Rebhann's & culmann's graphical method.		L2, L3	CO3
3	Define with neat sketch Earth pressure at Rest, Active & passive Earth pressure.	2	L2, L3	CO3
4	Define Finite slope. What are the causes for slope failure & also list various types of slope failures with sketches.	2	L2, L3	CO3
5	Explain the procedure for determination of factor of safety using method of slices for C-ϕ soil.	2	L2, L3	CO3
6	Explain Swedish method of slices of stability analysis of slopes.	2	L2, L3	CO3
7	A retaining wall 8m high with a smooth vertical back, retains a clay backfill with C=15 kN/m^2, ϕ=15^0 & Υ=18 kN/m^2. Calculate the total active thrust on the wall assuming that tension cracks may developed to the theoretical depth.	2	L3,L4	CO3
8	A 7m deep canal has side slope of 1:1. The properties of soil are C_u=20 kN/m^2, ϕ_u=15^0 e=0.9 & G=2.75. if Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number number for this condition is 0.137	2	L3,L4	CO3
9	An embankment is inclined at an angle of 35^0 & its height is 15m. the angle of shearing resistance is 15^0 & cohesion intercept is 40 kN/m^2. The unit weight of soil is 18 kN/m^2. Find the factor of safety with respect to cohesion. Consider Taylor's stability number as 0.06.	2	L3, L4	CO3
10	A retaining wall with a smooth vertical back is 6m high & retains cohesion less soil with a bulk unit weight of 18 kN/m^3 & ϕ=30^0. The top of the soil is level with the top of the wall & is horizontal. If the soil surface carries a uniformly distributed load of 5 kN/m^2. Determine using Rankine's theory, the total active earth thrust & draw the active pressure distribution diagram.	2		CO3

Subject (Course) Title	**APPLIED GEOTECHNICAL ENGINEERING &**
Subject (Course) Code	**17CV53**
Semester	**VI A**



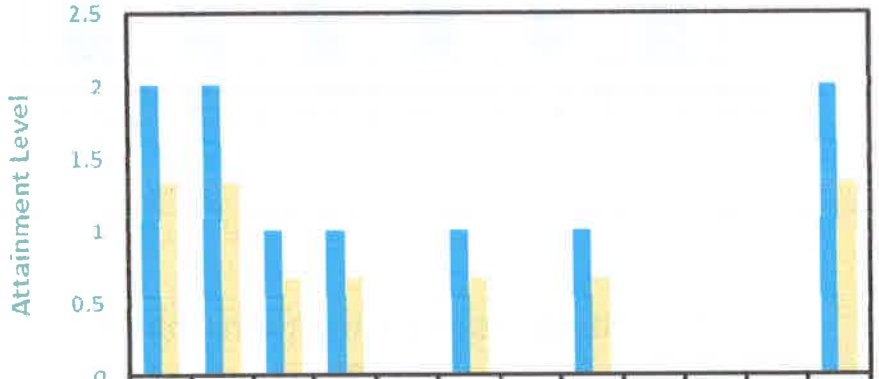


Target vs Class Average

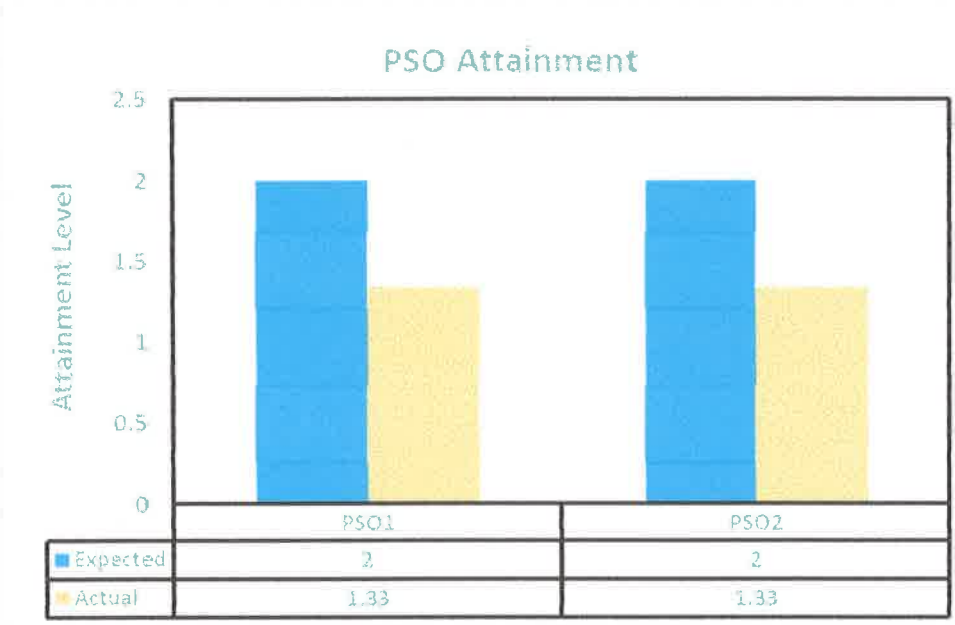


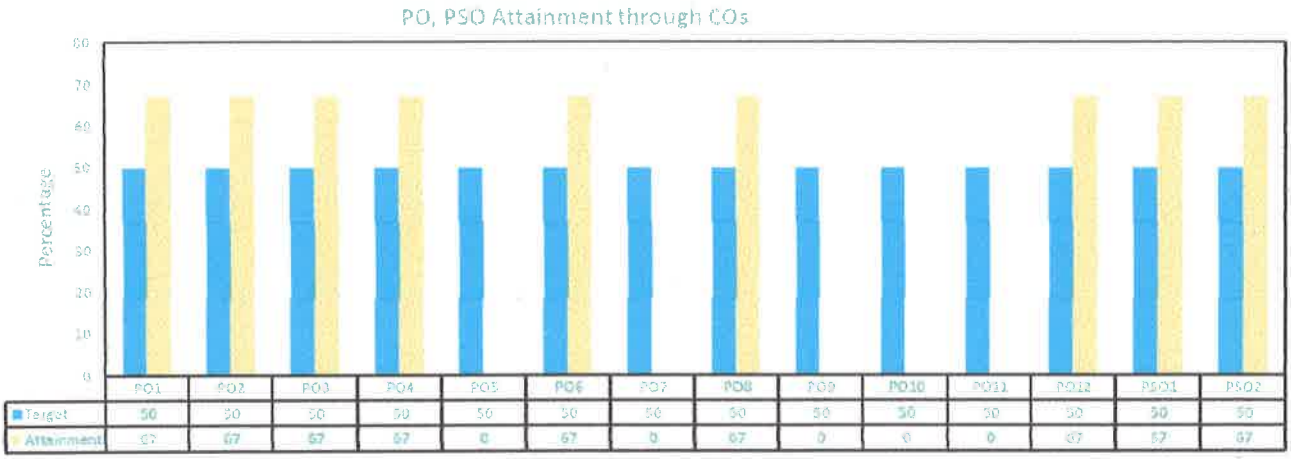
	CO1	CO2	CO3	CO4	CO5	CO6
Target	50	50	50	50	50	50
Class Average	29	29	34	73	46	33
Gap	21	21	16	0	4	17

PO Attainment



	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Expected	2	2	1	1	0	1	0	1	0	0	0	2
Actual	1.33	1.33	0.67	0.67	0	0.67	0	0.67	0	0	0	1.33


PSO Attainment
Attainment Level
2.5
2
1.5
1
0.5
0
PSO1
PSO2
Expected
2
2
Actual
1.33
1.33


PO, PSO Attainment through COs
Percentage
80
70
60
50
40
30
20
10
0
PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PSO1 PSO2
Target 50 50 50 50 50 50 50 50 50 50 50 50 50 50
Attainment 67 67 67 67 0 67 0 67 0 0 0 67 67 67