Ground Improvement Techniques

(GR18A4063)

IV-B.Tech – II Semester

(2022-22)

by

Mrs. Manisha G

Assistant Professor

Department of Civil Engineering

Gokaraju Rangaraju Institute of Engineering and Technology

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)
Ground Improvement Techniques

Course File Check List

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GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

GROUND IMPROVEMENT TECHNIQUES (PROFESSIONAL ELECTIVE V)

Pre-requisites: Geotechnical Engineering

Course Code:	**L**	**T**	**P**	**C**
IV Year II Semester	**3**	**0**	**0**	**3**

Course Objectives: The objectives of this course is to make the student to

1. Recognize various types of ground improvement techniques.
2. Select various ground improvement techniques like dewatering, grouting, in-situ densificationmethods, geo-synthetics, reinforced earth, soil stabilization, etc.
3. Educate solid foundation in terms of in-situ ground improvement methods required fordifferent projects that come across in difficult foundation conditions.
4. Identify the aptness of best ground improvement technique.
5. Improve on in most contemporary ground modification methods to be successful in real-time projects.

Course Outcomes: After completion of this course, students will be able to

1. Identify dewatering technique for the field related problem
2. Assess the field problems related to problematic soils by adopting various ground improvementtechniques.
3. Differentiate reinforced earth retaining structures.
4. Recognize the suitability and practicability required for various ground improvement methods.
5. Assess the importance of extensive research in various ground improvement techniques.

UNIT I

Introduction: Need for ground improvement, objectives, classification of ground improvementtechniques.

Dewatering: Methods of dewatering - sumps, single and multistage well points, vacuum wellpoints, electro-osmosis method, horizontal wells and drains.

UNIT II

In-situ densification methods in granular soils: Vibration at the ground surface, impact at the groundsurface, vibration at depth, impact at depth.

In-situ densification methods in cohesive soils: Preloading, vertical drains, sand drains, stone andlime columns, thermal methods.

UNIT III

Grouting: Characteristics of grouts, grouting methods, grouting technology, ascending, descending andstage grouting.

Stabilization: Methods of stabilization, mechanism of cement and lime stabilization, factors effectingstabilization.

UNIT IV

Reinforced Earth: Mechanism, components of reinforced earth, types of reinforcing elements, applications, factors governing design of reinforced earth walls, design principles of reinforced earth walls, soil nailing.

UNIT V

Geosynthetics: Types of geo synthetics, functions and applications of geo synthetic materials- geotextiles, geogrids and geomembranes.

Expansive soils: Problems of expansive soils, tests for identification, swelling pressure tests, improvement of expansive soils, foundation techniques in expansive soils, under-reamed piles.

TEXT BOOKS

1. Hausmann M.R. Engineering Principles of Ground Modification, McGraw-HillInternational Edition (1990).
2. Dr. P. Purushotham Raj, Ground Improvement Techniques, Laxmi Publications, NewDelhi, 1stedition (1999), Reprint (2013).

REFERENCE BOOKS

1. Moseley M.P. and K. Kirsch, Ground Improvement, Blackie Academic and Professional, Florida,2nd edition (2007).
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A, Ground Control and Improvement, John Wileyand Sons, New York, USA (1994).
3. Robert M. Koerner, Designing with Geosynthetics, Xlibris Corporation, 6th edition (2012).
4. F.H.Chen, Foundations on Expansive soils, Elsevier Science, 2nd edition (1988).

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TIME TABLE

IV BTech (GR18) – II semester

Sec-A

DAY/ HOUR	1	2	3	4	5	6
Monday	GIT					
Tuesday					GIT	
Wednesday						
Thursday						
Friday						
Saturday						

IV BTech (GR18) – II semester

Sec-B

DAY/ HOUR	1	2	3	4	5	6
Monday					GIT	
Tuesday	GIT					
Wednesday						
Thursday						
Friday						
Saturday						

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PROGRAMME EDUCATIONAL OBJECTIVES

1. Graduates of the programme will be successful in technical and professional career.

2. Graduates of the programme will have proficiency in solving real time Civil Engineering projects.

3. Graduates of the programme will continue to engage in life-long learning with ethical and social responsibility.

PROGRAM OUTCOMES:

Graduates of the Civil Engineering programme will be able to

a. Apply knowledge of mathematics, science and fundamentals of Civil Engineering.

b. Analyse problem and interpret the data.

c. Design a system component, or process to meet desired needs in Civil Engineering within realistic constraints.

d. Identify, formulate, analyse and interpret data to solve Civil Engineering problems.

e. Use modern engineering tools such as CAD and GIS for the Civil Engineering practice.

f. Understand the impact of engineering solutions in a global, economic and societal context.

g. Understand the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development.

h. Understanding of professional and ethical responsibility.

i. Work effectively as an individual or in a team and to function on multi-disciplinary context.

j. Communicate effectively with engineering community and society.

k. Demonstrate the management principles in Civil Engineering projects.

l. Recognize the need for and an ability to engage in life-long learning.

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COURSE OBJECTIVES

Academic Year : 2021-22 **Semester : II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject : Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

S. No	Course Objectives
1	Recognize various types of ground improvement techniques.
2	Select various ground improvement techniques like dewatering, grouting, in-situ densificationmethods, geo-synthetics, reinforced earth, soil stabilization, etc.
3	Educate solid foundation in terms of in-situ ground improvement methods required for different projects that come across in difficult foundation conditions.
4	Identify the aptness of best ground improvement technique.
5.	Improve on in most contemporary ground modification methods to be successful in real-time projects.

Signature of HOD Signature of faculty

Date: Date:

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COURSE OUTCOMES

Academic Year : 2021-22 **Semester : II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject : Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

On completion of this Subject/Course the student shall be able to:

S. No	Course Outcomes
1	Identify dewatering technique for the field related problem
2	Assess the field problems related to problematic soils by adopting various ground improvementtechniques.
3	Differentiate reinforced earth retaining structures.
4	Recognize the suitability and practicability required for various ground improvement methods.
5	Assess the importance of extensive research in various ground improvement techniques.

Signature of HOD Signature of faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090, India

2021-22 BATCH STUDENT ROLL LIST

SL NO	REG NO	NAME OF THE STUDENT
1	17241A0153	Sujith Kumar Shinde
2	17241A0157	Vuppula Mithunkumar Reddy
3	18241A0101	Ajmeera Ganesh
4	18241A0102	Anabotula Sravani
5	18241A0103	Anumatla Manoj
6	18241A0104	Byna Rishitha
7	18241A0105	Bura Tharasri
8	18241A0106	Pudari Badrinath Goud
9	18241A0107	Balasani Rohith
10	18241A0108	Bandari Veeraswamy
11	18241A0109	Bandi Varun Kumar
12	18241A0110	Bashipaka Pradeep
13	18241A0111	Bathula Nikhil
14	18241A0112	Batikiri Veerendra Swamy
15	18241A0113	Bhukya Soujanya
16	18241A0114	Bhukya Varun Naik
17	18241A0115	Boddu Pavan
18	18241A0116	Byagari Rangaraju
19	18241A0117	Chada Ruchita
20	18241A0118	Chinthakuntla Thriveen
21	18241A0119	Cv Jaswanth Surya
22	18241A0120	Dosapati Nishu

23	18241A0121	G Prashanth
24	18241A0122	Gaddipati Lohitha
25	18241A0123	Gangam Rohit Reddy
26	18241A0124	Gottemukkala Govardhan
27	18241A0125	Hrishikesh Bansal
28	18241A0126	Janapati Raju
29	18241A0127	Jyothika Mannava
30	18241A0128	K Harshitha Reddy
31	18241A0129	Kolan Reshikesh Reddy
32	18241A0130	Karri Bharath Chandra Reddy
33	18241A0131	Kuppala Nihar
34	18241A0132	Kurva Lavanya
35	18241A0133	Maddimsetty Sri Charan
36	18241A0134	MagaPor Manaswini
37	18241A0135	Maloth Bhavsingh
38	18241A0136	Malothu Naveena
39	18241A0137	Manda Ithihas
40	18241A0138	Mohammad Ashfaq Ahmed
41	18241A0139	Mohammed Omer Shareef
42	18241A0140	Mukundu Naveen
43	18241A0141	Nalumasu Sahithi
44	18241A0142	Nampelly Ravi Kumar
45	18241A0143	Narra Shashidhar Reddy
46	18241A0144	Patlola Vinay Reddy
47	18241A0145	Pattambetty Pavankumar
48	18241A0146	Pola Tharun
49	18241A0147	Posani S V A Kalyan
50	18241A0148	Pulle Manichadra

51	18241A0149	Rajulapati Rohit Naga Sai
52	18241A0150	Sura Subbaram Reddy
53	18241A0153	Sunkari Vikas
54	18241A0154	Thirupathi Rao Salla
55	18241A0155	Trivikram Reddy
56	18241A0156	Thrupti Shreya
57	18241A0157	Vakamalla Bhavya Sree
58	18241A0158	Vemula Manisha
59	18241A0159	Vuppula Keerthana
60	18241A0160	Yalla Anitha
61	19245A0101	KANCHERLA BHARATH
62	19245A0102	ELUPULA KUMARASWAMY
63	19245A0103	BRAHMADEVARA BHAVITHA
64	19245A0104	DASARI NAMRATHA
65	19245A0105	T CHANDANA
66	19245A0106	KOLA HARITHA

SECTION B

S.No	Roll No.	Student Name
1	16241A0161	Abdul Samad
2	18241A0161	A Nachiketh
3	18241A0162	Aleti Jagadish
4	18241A0163	Amirneni Anusha
5	18241A0164	Anireddy Avinash
6	18241A0165	Ashitha Golla
7	18241A0166	Animesh Baathuk
8	18241A0167	Boppu Lokesh
9	18241A0168	Budagam Harshith
10	18241A0169	Chilumula Sridhar
11	18241A0170	Dandre Vennela
12	18241A0171	Doti Upender

13	18241A0172	Eda Manasa
14	18241A0173	Gonda Harshini
15	18241A0174	Gore Kamalakar Sailesh
16	18241A0175	Gore Kamalakar Sandeep
17	18241A0176	Guddati Arun
18	18241A0177	Vijay Narasimha Reddy Kolagtla
19	18241A0178	Kancharakuntla Deepika
20	18241A0179	Kota Rashmitha
21	18241A0180	Kothuri Pranay
22	18241A0181	Kudala Rama
23	18241A0182	Kummari Srilekha
24	18241A0183	Kunchala Adarsh
25	18241A0184	Kurra Neeraj Prasad
26	18241A0185	Kyama Pavan
27	18241A0186	M Shekhar
28	18241A0187	Malraj Manvitha
29	18241A0188	Matharasi Sai Kumar
30	18241A0189	Md Ameer Sohail
31	18241A0190	Md Amir
32	18241A0191	Medari Vikram Aditya
33	18241A0192	Mediga Karthik
34	18241A0193	Moniesh Reddy Sunkara
35	18241A0194	Kaushik Nadella
36	18241A0195	Nikhitha Kasuvojula
37	18241A0196	Nunavath Suman
38	18241A0197	P Kishore
39	18241A0198	Peesu Spandana Reddy
40	18241A0199	Prathyusha Maddala
41	18241A01A0	Bavanari Pratyush
42	18241A01A1	Putta Rohith
43	18241A01A2	Rahul Pradhan
44	18241A01A3	Rampelli Pravalika
45	18241A01A4	Rangu Soniya
46	18241A01A5	Rentala Adarsh Reddy
47	18241A01A6	Ritish J
48	18241A01A7	Seelam Rahul Goud
49	18241A01A8	Shaik Afeez
50	18241A01A9	Shaik Shoaib
51	18241A01B0	Shivarathri Sai Kumar
52	18241A01B1	Shivarathri Tharun
53	18241A01B2	Sowmika Boyapati
54	18241A01B3	Vishruth Reddy T N
55	18241A01B4	Tekula Prashanth Reddy
56	18241A01B5	Teegala Someshwar

		Reddy
57	18241A01B6	Thatipamula Vigna Sai
58	18241A01B7	Thota Sri Sai
59	18241A01B8	Vedati Manikanta Karthik
60	18241A01B9	Vallapu Reddy Sushrutha
61	18241A01C0	Yanala Rithish Reddy
62	19245A0107	CHOUGONI SHIVASHANKAR
63	19245A0108	KOTA ANVESH
64	19245A0109	POLAGANI CHANDU GOUD
65	19245A0110	SADGARI KARTHIK
66	19245A0111	GUGULOTHU PAVAN
67	19245A0112	A RAGHAVENDRA

Signature of HOD

Date:

Signature of faculty

Date:

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GUIDELINES TO STUDY THE COURSE SUBJECT

Academic Year : 2021-2022 **Semester : II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject : Ground Improvement Techniques **Course Code** : GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Guide line to study the course/subject: Ground Improvement Techniques

This course helps the students to learn and understand about treatment methods that can be adopted in real life scenerios in the field. .

prerequisites:

Geotechnical Engineering

Where will this subject help?

- The feasibility of a land reclamation project often depends on the availability of a sufficient amount of good quality fill, within a reasonable distance of the site. If such fill is not accessible, improvement of the existing ground can offer a cost-effective solution to improve non-compliant material.
- Ground improvement is very flexible and feasible as it can be carried out at any location and at any time after construction is completed. This means that improvement can be limited to the locations where it is actually required. Ground improvement can then be used at other locations wherever and whenever required.

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BOOKS AND MATERIALS

Books and Codes	
1.	M.R. Engineering Principles of Ground Modification, McGraw-HillInternational Edition (1990).
2.	Dr. P. Purushotham Raj, Ground Improvement Techniques, Laxmi Publications, NewDelhi, 1stedition (1999), Reprint (2013).

Additional resources	
4.	Moseley M.P. and K. Kirsch, Ground Improvement, Blackie Academic and Professional, Florida,2nd edition (2007).
5	Xanthakos P.P, Abramson, L.W and Brucwe, D.A, Ground Control and Improvement, John Wileyand Sons, New York, USA (1994).
6.	Robert M. Koerner, Designing with Geosynthetics, Xlibris Corporation, 6th edition (2012).

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Department of Civil Engineering

COURSE DESIGN AND DELIVERY SYSTEM (CDD)

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD Signature of faculty
Date:

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COURSE SCHEDULE

Academic Year : 2021-22 **Semester : II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject : Ground Improvement Techniques **Course Code**: GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

The Schedule for the whole Course / Subject is:

1	Commencement of First Semester class work		10-01-2022
2	I Spell of Instructions	10-01-2022 to 5-03-2022	8 Weeks
3	I Mid-term Examinations	7-03-2023 to 09-3-2022	3 Days
4	II Spell of Instructions	10-03-2022 to 04-05-2022	8 Weeks
5	II Mid-term Examinations	05-05-2022 to 07-05-2022	3 Days
6	Preparation	09-05-2022 to 14-05-2022	1 Week
7	**End Semester Examinations** (Theory/ Practical) Regular/ Supplementary	16-05-2022 to 28-05-2022	2 Weeks

1. Total No. of Instructional periods available for the course: **64** Hours / Periods

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Department of Civil Engineering

SCHEDULE OF INSTRUCTIONS
COURSE PLAN

Academic Year: 2021– 22 **Branch:** B. Tech Civil Engineering

Subject: Ground Improvement Techniques **Class:** IV Year A Section **Sem: II**

Faculty Name: Manisha G(1647)

S.No.	Date	Topic
1	17-01-2022	Need for ground improvement, objectives
2	18-01-2022	classification of ground improvement techniques.
3	19-01-2022	Methods of dewatering - sumps
4	24-01-2022	single and multistage well points
5	25-01-2022	vacuum well points
6	26-01-2022	electro-osmosis method
7	31-01-2022	horizontal wells and drains.
8	01-02-2022	Vertical drains
9	02-02-2022	In-situ densification methods in granular soils
10	07-02-2022	Vibration at the ground surface
11	08-02-2022	impact at the ground surface
12	09-02-2022	vibration at depth, impact at depth.
13	14-02-2022	In-situ densification methods in cohesive soils
14	15-02-2022	Preloading, vertical drains
15	16-02-2022	Preloading, vertical drains
16	21-02-2022	sand drains
17	22-02-2022	stone columns
18	23-02-2022	lime columns
19	28-02-2022	Thermal methods- Ground Heating
20	02-03-2022	Thermal methods - Ground Freezing
21	07-03-2022	Grouting: Introduction, Characteristics of grouts
22	07-03-2022	grouting methods

23	08-03-2022	grouting technology
24	08-03-2022	ascending, descending and stage grouting
25	14-03-2022	ascending, descending and stage grouting
26	14-03-2022	Stabilization: Introduction
27	15-03-2022	Methods of stabilization
28	15-03-2022	Methods of stabilization
29	21-03-2022	mechanism of cement stabilization,
30	21-03-2022	mechanism of cement and lime stabilization,
31	22-03-2022	mechanism of lime stabilization,
32	22-03-2022	factors effecting stabilization.
33	28-03-2022	**Reinforced Earth**: Introduction
34	28-03-2022	Mechanism of reinforced earth
35	29-03-2022	components of reinforced earth
36	29-03-2022	types of reinforcing elements
37	04-04-2022	types of reinforcing elements
38	04-04-2022	applications of reinforced elements
39	05-04-2022	factors governing design of reinforced earth walls,
40	05-04-2022	design principles of reinforced earth walls
41	11-04-2022	design principles of reinforced earth walls
42	11-04-2022	soil nailing.
43	12-04-2022	soil nailing.
44	12-04-2022	Geosynthetics: Types of geo synthetics,
45	18-04-2022	functions of geo synthetic materials - geotextiles, geogrids and geomembranes.
46	18-04-2022	applications of geo synthetic materials - geotextiles, geogrids and geomembranes.
47	19-04-2022	Expansive soils: Problems of expansive soils
48	19-04-2022	tests for identification,
49	25-04-2022	swelling pressure tests,
50	25-04-2022	improvement of expansive soils,
51	26-04-2022	foundation techniques in expansive soils, under-reamed piles
52	26-04-2022	foundation techniques in expansive soils, under-reamed piles
53	02-05-2022	Revision
54	02-05-2022	Revision

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UNIT PLAN

Academic Year : 2021-22 **Semester : II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject : Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

S.no	Unit No	Name of the unit	Date
1	UNIT-I	Introduction; **Dewatering**	10-1-2022 – 2-2-2022
2	UNIT-II	Densification	2-2-2022 – 7-3-2022
3	UNIT-III	Grouting	7-3-2022 - 28-3-2022
4	UNIT-IV	Reinforced Earth	28-3-2022 11-4-2022
5	UNIT-V	Geosynthetics	12-4-2022 - 26-04-2022

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LESSON PLAN

Academic Year : 2021-22 **Date:** 17-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 1 Duration of Lesson: 60 min

Lesson Title : Introduction to GIT

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Learn about GIT basics

TEACHING AIDS : Newton software, Google classroom
TEACHING POINTS :

Need for ground improvement, objectives

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 18-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 2 Duration of Lesson: 60min

Lesson Title : GIT Basics

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Need for ground improvement, objectives
TEACHING AIDS : Newton software, Google classroom
TEACHING POINTS :

ground improvement objectives

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 19-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 3 Duration of Lesson: 60min

Lesson Title : classification of ground improvement techniques.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. about the processes involved in classification of ground improvement techniques.

TEACHING AIDS : Newton software, Google classroom
TEACHING POINTS :

classification of ground improvement techniques.

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

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LESSON PLAN

Academic Year : 2021-22 **Date:** 24-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 4 Duration of Lesson: 60 min

Lesson Title : single and multistage well points

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Understand the types of single and multistage well points – Installation and types

TEACHING AIDS : Newton software, Google classroom

TEACHING POINTS :

single and multistage well points

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

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Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 25-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 5 Duration of Lesson: 60 min

Lesson Title : vacuum well points

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. vacuum well points.

TEACHING AIDS : Newton software, Google classroom

TEACHING POINTS :

vacuum well points

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date: 25**-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 6 Duration of Lesson: 60min

Lesson Title : electro-osmosis method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

electro-osmosis method

TEACHING AIDS : Newton software, Google classroom

TEACHING POINTS :

electro-osmosis method

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 30-1-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 7 Duration of Lesson: 60 min

Lesson Title : horizontal wells and drains.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. horizontal wells and drains.

TEACHING AIDS : Newton software, Google classroom

TEACHING POINTS :

horizontal wells and drains.

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 1-2-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 8 Duration of Lesson: 60min

Lesson Title : Vertical drains

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Understand the concept of Vertical drains.

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

Vertical drains

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 2-2-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 9 Duration of Lesson: 60 min

Lesson Title : In-situ densification methods in granular soils

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- In-situ densification methods in granular soils

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

In-situ densification methods in granular soils

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 7-2-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 10 Duration of Lesson: 60 min

Lesson Title : Vibration at the ground surface

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Vibration at the ground surface

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Vibration at the ground surface

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 08-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 11 Duration of Lesson: 60 min

Lesson Title : impact at the ground surface

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Understand the concept and applications of impact at the ground surface

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

impact at the ground surface

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 09-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 12 Duration of Lesson: 60 min

Lesson Title : vibration at depth, impact at depth.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Understand the concept and uses of vibration at depth, impact at depth.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

vibration at depth, impact at depth.

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 14-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 13 Duration of Lesson: 60 min

Lesson Title : In-situ densification methods in cohesive soils

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- In-situ densification methods in cohesive soils

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

In-situ densification methods in cohesive soils

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date: 15**-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 13 Duration of Lesson: 60 min

Lesson Title : Preloading, vertical drains

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Preloading, vertical drains

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Preloading, vertical drains

Assignment / Questions:

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos..

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 16-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 14 Duration of Lesson: 60 min

Lesson Title : In-situ densification methods in cohesive soils

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

In-situ densification methods in cohesive soils

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

In-situ densification methods in cohesive soils

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 22-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 15 Duration of Lesson: 60 min

Lesson Title : sand drains

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

sand drains

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

sand drains

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 23-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 16 Duration of Lesson: 60 min

Lesson Title : Stone columns

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Stone columns

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Stone columns

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 23-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 17 Duration of Lesson: 50 min

Lesson Title : lime columns.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- lime columns

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

lime columns

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 28-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 18 Duration of Lesson: 60 min

Lesson Title : Thermal methods- Ground Heating

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Recognize various Thermal methods- Ground Heating

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Thermal methods- Ground Heating

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 29-02-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 19 Duration of Lesson: 60 min

Lesson Title : Thermal methods- Ground Freezing

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Thermal methods- Ground Freezing.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Thermal methods- Ground Freezing

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date: 7**-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 20 Duration of Lesson: 60 min

Lesson Title : Grouting: Introduction, Characteristics of grouts

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Grouting: Introduction, Characteristics of grouts

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Grouting: Introduction, Characteristics of grouts

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 7-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 21 Duration of Lesson: 60 min

Lesson Title : Grouting: Introduction, Characteristics of grouts

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Grouting: Introduction, Characteristics of grouts

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Grouting: Introduction, Characteristics of grouts

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 8-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 22 Duration of Lesson: 60 min

Lesson Title : grouting technology

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- grouting technology.

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

grouting technology

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 8-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 23 Duration of Lesson: 60 min

Lesson Title : ascending, descending and stage grouting

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- ascending, descending and stage grouting

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

ascending, descending and stage grouting

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 14-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 24 Duration of Lesson: 60 min

Lesson Title : ascending, descending and stage grouting.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- ascending, descending and stage grouting.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

ascending, descending and stage grouting

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 14-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 25 Duration of Lesson: 60 min

Lesson Title Stabilization: Introduction

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Stabilization: Introduction

.TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Stabilization: Introduction

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 15-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 26 Duration of Lesson: 50 min

Lesson Title : Methods of stabilization

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Methods of stabilization.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Methods of stabilization

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : **2021-22** **Date:** 16-03-2022
Semester : **II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil

Engineering

Lesson No : 27 Duration of Lesson: 60 min

Lesson Title : Methods of stabilization

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Methods of stabilization
TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

Methods of stabilization

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 22-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 28 Duration of Lesson: 60 min

Lesson Title : mechanism of cement stabilization,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- mechanism of cement stabilization.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

mechanism of cement stabilization,

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date: 22-**03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 29 Duration of Lesson: 50 min

Lesson Title : factors effecting stabilization.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- factors effecting stabilization.

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

factors effecting stabilization.

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : **2021-22** **Date:** 28-03-2022
Semester : **II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 30 Duration of Lesson: 50 min

Lesson Title : Reinforced Earth: Introduction

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Reinforced Earth: Introduction

TEACHING AIDS : Projector, Demonstration

TEACHING POINTS :

Reinforced Earth: Introduction

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 28-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 31 Duration of Lesson: 60 min

Lesson Title : Mechanism of reinforced earth

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- Mechanism of reinforced earth
-

TEACHING AIDS : Projector, Demonstration
TEACHING POINTS :

Mechanism of reinforced earth

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 29-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 32 Duration of Lesson: 50 min

Lesson Title : Components of reinforced earth

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

Components of reinforced earth

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

Components of reinforced earth

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date: 29**-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 33 Duration of Lesson: 60 min

Lesson Title : types of reinforcing elements

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- types of reinforcing elements.

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

types of reinforcing elements

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 24-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 35 Duration of Lesson: 60 min

Lesson Title : applications of reinforced elements

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

applications of reinforced elements

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

applications of reinforced elements

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 24-03-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 36 Duration of Lesson: 60 min

Lesson Title : applications of reinforced elements.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

applications of reinforced elements

TEACHING AIDS : Projector, White board, demonstration

applications of reinforced elements

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : **2021-22** **Date:** 5-04-2022
Semester : **II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 37 Duration of Lesson: 60 min

Lesson Title : factors governing design of reinforced earth walls,.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- factors governing design of reinforced earth walls,.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

factors governing design of reinforced earth walls

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : **2021-22** **Date:** 5-4-2022
Semester : **II**
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code**: GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 38 Duration of Lesson: 60 min

Lesson Title: design principles of reinforced earth walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- design principles of reinforced earth walls.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

design principles of reinforced earth walls

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 11-04-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** :

GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 39 Duration of Lesson: 60 min

Lesson Title: design principles of reinforced earth walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- design principles of reinforced earth walls.

TEACHING AIDS : Projector, White board, demonstration

TEACHING POINTS :

design principles of reinforced earth walls

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

LESSON PLAN

Academic Year : 2021-22 **Date:** 11-04-2022
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code**: GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Lesson No : 40 Duration of Lesson: 60 min

Lesson Title: soil nailing.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

- soil nailing..

TEACHING AIDS : Projector, White board, demonstration
TEACHING POINTS :

soil nailing.

Assignment / Questions:

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

COURSE COMPLETION STATUS

Academic Year : 2021-22
Semester : II
Name of the Program: B.Tech **Year: IV Year**

Course/Subject Ground Improvement Techniques **Course Code** : GR18A4063

Name of the Faculty : Ms. Manisha G

Designation: Assistant Professor **Department:** Civil Engineering

Actual Date of Completion & Remarks, if any

Units	Remarks	No. of Objectives Achieved	No. of Outcomes Achieved
UNIT - I	Covered on time	2	3
UNIT - II	Covered on time	2	3
UNIT - III	Covered on time	3	3
UNIT – IV	Covered on time	2	2
UNIT - V	Covered on time	2	2

Signature of HOD Signature of faculty

Date: Date:

Note: After the completion of each unit mention the number of Objectives & Outcomes Achieved.

.

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering

EVALUATION STRATEGY

Academic **Y**ear : 2021-22

Semester : II

Name of the Program: B.Tech, Civil Engineering Year: IV year
Section: A

Course/Subject: Ground Improvement Techniques Course Code: GR18A4063
Name of the Faculty: Manisha Gunturi Dept.: Civil Engineering

Designation: Assistant Professor

1. TARGET:
a) Percentage for pass: 100%
b) Percentage of class:

First class with distinction	
First class	
Pass class	
Total strength	

2. **COURSE PLAN & CONTENT DELIVERY**

- .

3. **METHOD OF EVALUATION**

3.1 ☐ Continuous Assessment Examinations (CAE-I, CAE-II)

3.2 ☐ Assignments/Seminars

3.3 ☐ Mini Projects

3.4 ☐ Quiz

3.5 ☐ Semester/End Examination

3.6 ☐ Others

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this Semester.

.

Signature of HOD
Date:

Signature of faculty
Date:

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(Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Mappings of CO's, COB's Vs PO's, POB's

Course Objectives - Course Outcomes Relationship Matrix

Course Outcomes / Course Objectives	1	2	3	4	5
1		X			
2				X	
3	X				
4			X		
5					X

Course Outcomes - Program Outcomes relations (Contributions: High, Medium and Low)

Code	Subject	Course Outcomes	Programme Outcomes											
			a	b	c	d	e	f	g	h	i	j	k	l
IV Year I Semester														
GR18A4063	GIT	1		H		H			M					M
		2		H	H	M						M		H
		3	M		H	H			H				M	
		4		H	M	H			H				M	
		5	M	H	H	H		M	H		M		H	H

Course Objectives - Program Outcomes (PO's) Relationship Matrix

Program Outcomes / Course Objectives	a	b	c	d	e	f	g	h	i	j	k	l
1		H		H			M					M
2		H	H	M						M		H

3	M		H	H			H				M	
4		H	M	H			H				M	
5	M	H	H	H		M	H		M		H	H

Course Outcomes - Program Outcomes relations (PO's) Relationship Matrix

Program Outcomes / Course Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
1		H		H			M					M
2		H	H	M						M		H
3	M		H	H			H				M	
4		H	M	H			H				M	
5	M	H	H	H		M	H		M		H	H

Program Educational Objectives (PEOs)- Course Outcomes Relationship Matrix

Program Educational Objectives / Course Outcomes	1	2	3
1	X	X	X
2	X	X	X
3	X	X	X
4	X	X	
5	X	X	X

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Assessment in Program Outcomes (PO's) Relationship Matrix

Assessment:

1. Assignment
2. Internal Examination
3. External Examination
4. Practical Projects
5. Viva

Program -Outcomes / Course	a	b	c	d	e	f	g	h	i	j	k	L
GIT	X	X			X	X	X	X	X	X	X	X

Assignments & Assessments-Program Educational Objectives (PEO's) Relationship Matrix

Assessment:

1. Assignment
2. Internal Examination
3. External Examination
4. Practical Projects
5. Viva

PEOs	1	2	3

Assessments			
1	X	X	X
2	X	X	X
3	X	X	X
4	X	X	X
5	X	X	X

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Rubric Template – GIT

Academic **Y**ear : 2021-22

Semester : II

Name of the Program: B.Tech, Civil Engineering Year: IV year
Section: A

Course/Subject: Ground Improvement Techniques Course Code: GR18A4063
Name of the Faculty: Manisha Gunturi Dept.: Civil Engineering

Designation: Assistant Professor

Students Outcomes:

		Beginning	**Developing**	**Reflecting Development**	**AccompliSHed**	**Exemplary**	**Score**
Name of the Student	**Performance Criteria**	**1**	**2**	**3**	**4**	**5**	

18241A0136	Identify various building materials and their structural requirements.	Low level	Able to understand	Ability to explain	Full knowledge	Thoroughly analyzing & applying	
	Explain the significance of cement and lime in construction.	Low level	Able to understand	Ability to explain	Full knowledge	Thoroughly analyzing & applying	
	Identify the suitable material for construction and various building components.	Low level	Able to understand	Ability to explain	Full knowledge	Thoroughly analyzing & applying	
	Review different types of masonry construction.	Low level	Able to understand	Ability to explain	Full knowledge	Thoroughly analyzing & applying	
	Discuss about various building services and planning and their characteristics	Low level	Able to understand	Ability to explain	Full knowledge	Thoroughly analyzing & applying	

Assignment 1

1. What is dewatering? What are the various methods of dewatering?
2. What is vibro-compaction? In which soils is it adopted?
3. What is stone column? What are the methods of installing a stone column?
4. Explain in detail the role of ground improvement in foundation engineering.
5. What are the various geotechnical problems faced with black cotton soil, laterite soil and alluvial soil deposits?
6. What are the factors influencing the selection of ground improvement techniques?

Assignment-2

1. Differentiate vibro-displacement from vibro-replacement stone columns.
2. What is the function of vertical drain? Write the various types of vertical drains used in ground improvement.
3. Explain in detail the method of dynamic compaction of cohesionless and dynamic consolidation of cohesive soil.

4. Write in detail the principle, operation and applications of vibro-compaction method of ground improvement.
5. How does a sand compaction pile improve the soil? Write a detailed note on its installation and functioning.

Assignment 3

1. What are suspension grouts?
2. Write applications of grouting.
3. Explain compaction grouting. To which type of soils is it applicable. What are its advantages and disadvantage?
4. Explain the jet grouting process.
5. Draw a typical layout of a grouting plant. Also mention the basic items required for a grouting plant along with their functions.

Assignment 4

1. Give basic mechanism of reinforced earth.
2. Explain in detail the behaviour of soil on reinforcing with geotextiles

Assignment 5

1. . Enumerate the effects of soil stabilization by heating
2. Which lime is used for soil stabilization? What reactions take place on addition of lime to wet soil? How lime is helpful in soil stabilization?
3. How is the permeability of soil affected by geotextiles?
4. What are geotextiles? What design considerations should be kept in mind while using geotextiles in pavements?
5. How the soil properties improve with use of geotextiles?

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

IV B.TECH. II SEM., I MID-TERM EXAMINATION, March-2022

Ground Improvement Techniques (GR18A4063)

Duration: 10 min Max. Marks: 5

Name: **Roll No.**

Answer all the Multiple choice Questions

1. Sheep foot rollers are recommended for compacting [ ]
   (a) Granular soils (c) Hard rock soils
   (b) Cohesive soils (d) Any type of soil
2. In a compaction test if the compacting effort is increased, it will result in [ ]
   (a) Increase in MDD and OMC (c) Increase in MDD and decrease in OMC
   (b) Increase in MDD but OMC remains unchanged (d) No change in MDD but decrease in OMC.
3. Soil compacted at which one of the following when a higher compactive effort produces highest increase in dry density? [ ]
   (a) Optimum moisture content (c) Wet of optimum moisture content
   (b) Dry of optimum moisture content (d) Saturation moisture content
4. In case of deep well system, the depth of drawdown can be [ ]
   (a) 10 m (c) Shallow depth (<10 m)
   (b) 20 m (d) Greater depth
5. Vacuum dewatering system is suitable for [ ]
   (a) Granular soils (c) Clayey soils
   (b) Stratified soils (d) Loamy soils
6. Vertical drains are generally used in combination with preloading in which of the following type of soils [ ]
   (a) Clayey soils (c) Coarse grained soils
   (b) Silty soils (d) Stratified soils
7. Which of the following dewatering methods is suitable if gravity methods cannot be applied: [ ]
   (a) Deep well dewatering system (c) Open sumps and ditches
   (b) Vacuum dewatering system (d) None of the above
8. Repairing a ground underneath a formation or cracks and structural defects on building masonry or pavement and sunken or DPC is achieved through [ ]
   (a) Electro-osmosis (c) both
   (b) Grouting (d) Well point
9. The diameter of vibrofloat used in stone coloumns in case of stiff clays is [ ]
   (a) 0.6m (c) 1.8m
   (b) 1.5m (d) All
10. Continuous drainage are sometimes constructed beneath dams and basements floor slabs to provide highly permeable drainage path is called as [ ]
    (a) Foundation Drain
    (b) Blanket Drain
    (c) both
    (d) none

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

IV B.TECH. II SEM., I MID-TERM EXAMINATION, March-2022

Ground Improvement Techniques (GR18A4063)

Time: 90 min Max. Marks: 15

Name: **Roll No.**

SUBJECTIVE

Answer any three Out of Four **3*5 = 15 Marks**

1	Identify a suitable type of dewatering technique that can be adopted for clayey soils? Enumerate its working principle with the help of a neat sketch.	BT1	CO1
	In fine sands and silts, with permeabilities of order 10^{-4} to 10^{-6} m/s, water does not flow freely under the influence of gravity due to capillary tension. In such cases, which method of dewatering is recommended and why?	BT2	CO1
2	Illustrate an appropriate treatment technique for the achieving densification along with reduction in settlement and increase in load-bearing capacity of sand deposits.	BT3	CO2
	Analyze the characteristics of a filter material that makes it suitable to use as a filler material?	BT4	CO2
3	During the excavation for the construction of a tunnel, three types of faults were encountered. In due course of time, three collapses occurred in the tunnel near the faults. Considering the nature of a collapsed area, and the result of the site investigation, it was necessary to choose and design a consolidation system able to: i. Guarantee a certain geometrical accuracy of the treatment area. ii. Fit different ground conditions. iii. Avoid impact on the dewatering system. iv. Be easily estimated in term of execution time, material consumption and costs. v. Use existing plant wherever possible. vi. Be verified in field trials before implementation. vii. Be robust and flexible. For the above case, propose a suitable ground improvement?	BT5	CO2
	Hypothesize the criteria for selection of a suitable ground improvement technique.	BT6	CO2
4	Describe the factors that decide the rate of injection of grout into the soils?	BT2	CO3
	Construct a typical layout of a grouting plant. Also mention the basic items required for a grouting plant along with their functions.	BT3	CO3

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

IV B.TECH. II SEM., II MID-TERM EXAMINATION, March-2022

Ground Improvement Techniques (GR18A4063)

Date: 05-05-2022 Time: 10 min Max. Marks: 15

Name: **Roll No.**

OBJECTIVE

Answer all the questions **10*0.5 = 5 Marks**

1 The point at which plastic limit increase and then decrease is _____ [ ]

a) Lime point
b) Fixing point
c) Lime fixation point
d) Lime reducing point

2 The increase in soil strength depends on _____ [ ]

a) Thixotropy
b) Activity
c) Shear
d) Clay fraction

3 The essential feature of reinforced earth is that _____ develops between compacted layer of earth and reinforcing elements. [ ]

a) Friction
b) Tension
c) Compression
d) Shear

4 The reinforcement members are used to provide _____ in earth mass where _____ are produced. [ ]

a) tensile strength, compressive stresses
b) tensile strength, shear stresses\
c) compressive strength, tensile stresses
d) shear strength, tensile stresses

5 By the use of reinforcing elements in earth _____ [ ]

a) it restrains lateral deformation
b) it provides lateral deformation
c) it produces shear stress
d) it produces shear failure

6 The soil used in the backfill should have particles of not more than _____ passing 63 µm sieve. [ ]

a) 10%
b) 20%
c) 30%
d) 40%

7 What is the name of the product that has a geosynthetic as well as another material in it? [ ]

a) Geopolymer
b) Geocomposite
c) Geoblend
d) Geoamalgam

8 Geotextiles can be placed in between two layers of the pavement to _____ [ ]

a) Strengthen them
b) Interlock them

c) Separate them
d) Protect them

9 Under-reamed pile foundation is most suitable for _____ type of condition. [ ]

a) Seasonal moisture change
b) Dry conditioned soil
c) Cohesive type of soil
d) All the above

10 Presence of sand and silt-size particles in a clay deposit reduces_____ [ ]

a) Swelling of soil
b) Volume
c) Water content
d) Total shrinkage

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

IV B.TECH. II SEM., II MID-TERM EXAMINATION, March-2022

Ground Improvement Techniques (GR18A4063)

Date: 05-05-2022 Time: 90 min Max. Marks: 15

Name: **Roll No.**

SUBJECTIVE

Answer any three Out of Four **3*5 = 15 Marks**

1	(a) List out various stabilizers that can be used for stabilization of clayey soils.	BT1	CO3
	(b) Indicate the advantages of stabilization over other ground improvement techniques.	BT2	CO3
2	(a) Demonstrate various types of earth retaining structures with their applications.	BT3	CO4
	(b) Analyse the various modes of stability of retaining walls with sketches.	BT4	CO4
3	(a) Elaborate the role of geosynthetics in protecting soil from contamination.	BT5	CO5
	(b) Propose a special type of foundation that can resist uplift pressures caused be expansive soils. Also indicate its stages of construction with the help of neat sketch.	BT6	CO5
4	(a) Deduce the applicability of soil nailing while focusing on its basic mechanism.	BT4	CO4
	(b) Provide supportive statements in favor of geosynthetic materials for ground improvement.	BT5	CO5

Internal Marks

IV A Section

Roll Number	Student Name	MID I (20)	MID II(20)
17241A0153	Sujith Kumar Shinde	5	10.5
17241A0157	Vuppula Mithunkumar Reddy	5	13
18241A0101	Ajmeera Ganesh	0	0
18241A0102	Anabotula Sravani	11	11.5
18241A0103	Anumatla Manoj	8.5	9
18241A0104	Byna Rishitha	4.5	8.5
18241A0105	Bura Tharasri	9	12.5
18241A0106	Pudari Badrinath Goud	0	0
18241A0107	Balasani Rohith	7.5	12
18241A0108	Bandari Veeraswamy	5.5	14.5
18241A0109	Bandi Varun Kumar	0	5
18241A0110	Bashipaka Pradeep	0	10.5
18241A0111	Bathula Nikhil	4.5	11.5
18241A0112	Batikiri Veerendra Swamy	8.5	15.5
18241A0113	Bhukya Soujanya	8.5	15
18241A0114	Bhukya Varun Naik	9	15.5
18241A0115	Boddu Pavan	9	13.5
18241A0116	Byagari Rangaraju	0	5.5
18241A0117	Chada Ruchita	12.5	10.5
18241A0118	Chinthakuntla Thriveen	7.5	13.5
18241A0119	Cv Jaswanth Surya	2.5	6.5
18241A0120	Dosapati Nishu	14	13.5
18241A0121	G Prashanth	4.5	8
18241A0122	Gaddipati Lohitha	4.5	9.5
18241A0123	Gangam Rohit Reddy	4.5	10.5
18241A0124	Gottemukkala Govardhan	7.5	9.5
18241A0125	Hrishikesh Bansal	7	12.5
18241A0126	Janapati Raju	9.5	12.5
18241A0127	Jyothika Mannava	13.5	15.5
18241A0128	K Harshitha Reddy	9	13.5
18241A0129	Kolan Reshikesh Reddy	6	10.5
18241A0130	Karri Bharath Chandra Reddy	7.5	13.5
18241A0131	Kuppala Nihar	9.5	12.5
18241A0132	Kurva Lavanya	10.5	11.5
18241A0133	Maddimsetty Sri Charan	4.5	7
18241A0134	MagaPor Manaswini	13.5	13
18241A0135	Maloth Bhavsingh	6	15
18241A0136	Malothu Naveena	17.5	18

18241A0137	Manda Ithihas	5	12
18241A0138	Mohammad Ashfaq Ahmed	11.5	15.5
18241A0139	Mohammed Omer Shareef	13	16.5
18241A0140	Mukundu Naveen	0	0
18241A0141	Nalumasu Sahithi	7.5	9.5
18241A0142	Nampelly Ravi Kumar	8.5	14.5
18241A0143	Narra Shashidhar Reddy	13	10
18241A0144	Patlola Vinay Reddy	4.5	6.5
18241A0145	Pattambetty Pavankumar	4.5	14.5
18241A0146	Pola Tharun	5.5	14
18241A0147	Posani S V A Kalyan	8.5	9
18241A0148	Pulle Manichadra	8	11
18241A0149	Rajulapati Rohit Naga Sai	15.5	19
18241A0150	Sura Subbaram Reddy	4	8.5
18241A0153	Sunkari Vikas	11.5	17
18241A0154	Thirupathi Rao Salla	6.5	17
18241A0155	Trivikram Reddy	2	7.5
18241A0156	Thrupti Shreya	5	7.5
18241A0157	Vakamalla Bhavya Sree	12	14
18241A0158	Vemula Manisha	9.5	12
18241A0159	Vuppula Keerthana	9	13.5
18241A0160	Yalla Anitha	5	12.5
19245A0101	KANCHERLA BHARATH	11.5	17.5
19245A0102	ELUPULA KUMARASWAMY	7	17
19245A0103	BRAHMADEVARA BHAVITHA	12	18
19245A0104	DASARI NAMRATHA	12.5	13.5
19245A0105	T CHANDANA	11.5	16.5
19245A0106	KOLA HARITHA	7.5	15

IV B Section

Roll Number	Student Name	MID I (20)	MID II(20)
16241A0161	Abdul Samad	5.5	6
18241A0161	A Nachiketh	2.5	12
18241A0162	Aleti Jagadish	2	7.5
18241A0163	Amirneni Anusha	12	16.5
18241A0164	Anireddy Avinash	7	12
18241A0165	Ashitha Golla	4.5	9
18241A0166	Animesh Baathuk	4	8.5
18241A0167	Boppu Lokesh	4	12
18241A0168	Budagam Harshith	3.5	7
18241A0169	Chilumula Sridhar	6	9.5

18241A0170	Dandre Vennela	11	16
18241A0171	Doti Upender	7.5	11
18241A0172	Eda Manasa	5	16
18241A0173	Gonda Harshini	11.5	17
18241A0174	Gore Kamalakar Sailesh	6.5	11
18241A0175	Gore Kamalakar Sandeep	5	9
18241A0176	Guddati Arun	5.5	12.5
18241A0177	Vijay Narasimha Reddy Kolagtla	7.5	11
18241A0178	Kancharakuntla Deepika	7.5	15
18241A0179	Kota Rashmitha	2.5	3
18241A0180	Kothuri Pranay	4.5	14
18241A0181	Kudala Rama	5	12
18241A0182	Kummari Srilekha	7.5	12.5
18241A0183	Kunchala Adarsh	5	9.5
18241A0184	Kurra Neeraj Prasad	5.5	8
18241A0185	Kyama Pavan	5	10
18241A0186	M Shekhar	8.5	14
18241A0187	Malraj Manvitha	11	17.5
18241A0188	Matharasi Sai Kumar	5.5	6.5
18241A0189	Md Ameer Sohail	7	15
18241A0190	Md Amir	7.5	13.5
18241A0191	Medari Vikram Aditya	7	10
18241A0192	Mediga Karthik	8	16
18241A0193	Moniesh Reddy Sunkara	3	6
18241A0194	Kaushik Nadella	4.5	7.5
18241A0195	Nikhitha Kasuvojula	13	15.5
18241A0196	Nunavath Suman	5	11.5
18241A0197	P Kishore	3.5	5
18241A0198	Peesu Spandana Reddy	4	10.5
18241A0199	Prathyusha Maddala	9	15
18241A01A0	Bavanari Pratyush	9	13.5
18241A01A1	Putta Rohith	7	9.5
18241A01A2	Rahul Pradhan	11.5	16
18241A01A3	Rampelli Pravalika	11	13.5
18241A01A4	Rangu Soniya	10	17
18241A01A5	Rentala Adarsh Reddy	8	15.5
18241A01A6	Ritish J	5	9.5
18241A01A7	Seelam Rahul Goud	5.5	9.5
18241A01A8	Shaik Afeez	7.5	12
18241A01A9	Shaik Shoaib	8	10.5
18241A01B0	Shivarathri Sai Kumar	3.5	4.5
18241A01B1	Shivarathri Tharun	5.5	3
18241A01B2	Sowmika Boyapati	12.5	13.5
18241A01B3	Vishruth Reddy T N	8.5	9
18241A01B4	Tekula Prashanth Reddy	10	14

18241A01B5	Teegala Someshwar Reddy	7.5	14
18241A01B6	Thatipamula Vigna Sai	7.5	10.5
18241A01B7	Thota Sri Sai	8.5	14.5
18241A01B8	Vedati Manikanta Karthik	13	16
18241A01B9	Vallapu Reddy Sushrutha	12	17
18241A01C0	Yanala Rithish Reddy	11.5	16
19245A0107	CHOUGONI SHIVASHANKAR	12.5	14
19245A0108	KOTA ANVESH	5	7.5
19245A0109	POLAGANI CHANDU GOUD	11.5	16.5
19245A0110	SADGARI KARTHIK	10	12.5
19245A0111	GUGULOTHU PAVAN	11.5	13.5
19245A0112	A RAGHAVENDRA	12.5	13

T. Raghmitha

Gokaraju Rangaraju Institute of Engineering & Technology

(Autonomous College Affiliated to JNTUH) (12 Pages)

Bachupally, Kukatpally, Hyderabad - 500090

I | II **MID TERM EXAMINATION**

No. 419308

H.T. No. 18241A0179

Name of the Examination IV B.Tech I mid Term Examination

Course Ground Improvement Techniques Branch Civil Date 07-03-2022

Signature of the Invigilator 7/3/22

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	1												1

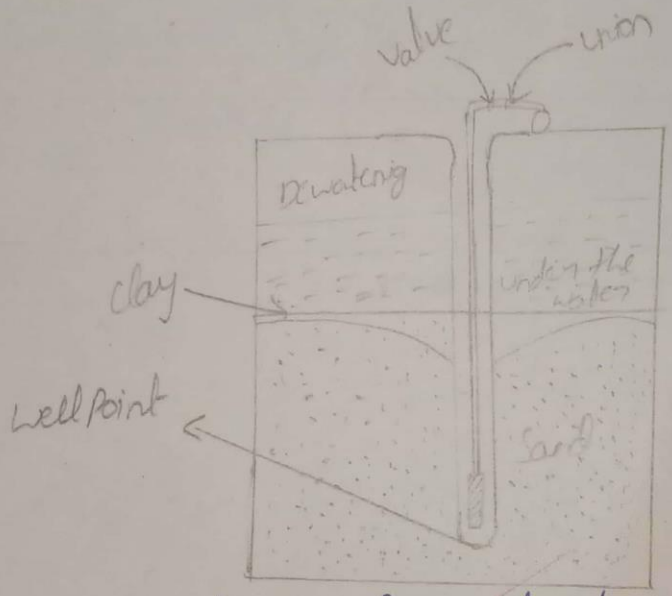
START WRITING FROM HERE

1) Dewatering technique that can be defined as the considered in refers to the well point, deepwell, & bypass and flood control.

In WellPoint and deepwell ~~that~~ are the submersible pumped as a installed pipe In the suitable points.

Scanned with CamScanner

Bn bypass and flood control are the submersi-
-ble Pumps on the suitable areas.



Methods of a dewatering level.

The dewatering techniques considered as a
suitable areas on the ground water level
Pump

Scanned with CamScanner

Amrutha Gautam

Proposed Date: : 13 05 2022 AO : Sign with date stamp

IBERS Form No:

Gokaraju Rangaraju Institute of Engineering & Technology
(Autonomous College Affiliated to JNTUH) (12 Pages)
Bachupally, Kukatpally, Hyderabad - 500090

✓	II	MID TERM EXAMINATION

Amrutha

No. 919154

H.T. No. 1 8 2 4 1 A 0 1 6 6

Name of the Examination IV B.Tech IInd sem Ist mid exam

Course Ground improvement Techniques Branch Civil Date 09-05-2022

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	1		1				1						3

START WRITING FROM HERE

4 a) jet grouting is a technique where high-speed water jets emanating from a drill bit cut into alluvial soils, as the drill bit is withdrawn, grout is pumped through horizontal nozzles and mixes with or displaces soil.

- The original foundation material is thus replaced with, stronger or more impermeable grout soil mixture.
- Jet grouting may be used to form cutoff walls, to underpinning or form deep foundation. similar to grouted auger piles.

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1a) • when soil is microscopic, it is diff to draw water from it, as the permeability of such soil is very poor. Such soils hold water by capilary.

• Electrical prop. of water in cavity between soil particles are used to dispose of water from such soils

• In saturated soil, two electrodes one ~~anode~~ positive and other negative, direct current passed between these poles

• water is repelled from anode and attracted by cathode

• This method used for dewatering in silts, clayey silts, fine clayey silty sands.

2a). A filter consists of layers of impervious layers materials is known as graded filter.

• Graded filter permits the flow of water but prevents the movement of perfect water filter

• Application are used as water purification

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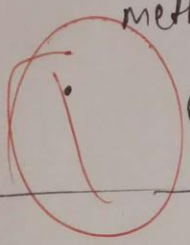
- Some of pharmecitical industries use this.
- Used in food industry to remove unwanted particles.

x continue.

- And also used to separate some chemicals
- Some stuck sampling and absorption materials methods of air pollution monitoring
- Particle size increase in direction of flow.



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I | II **MID TERM EXAMINATION**

No. 419318

H.T. No. 1 8 2 4 1 A 0 1 9 5

Name of the Examination IV BTech II Semester I Mid Examination

Course B Tech Branch Civil Engineering Date 07/03/2022

Signature of the Invigilator K. Nikhil

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	2	2	2	1½		2	1½						11

START WRITING FROM HERE

1 a) The dewatering technique which can be used for saturated fine grain soil is Electro-osmosis.

The Electro-osmosis is a technique in which electric potential is applied at two electrodes and water is pumped out from the cathode. The Electro-osmosis is hundred times better than that of all the mechanical techniques.

This method consists of two electrodes Anode & Cathode. The anode is made of steel piper whereas the cathode is made of perforated piper.

The clayey particles are in a bond with the negatively charged ions of the tube. When electricity is applied Potential is developed and this creates breakage of

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used for the extraction of water. The waters extracted by screens of pipes are collected at the header and header is connected to the pump. When pump is working water at different heights in screens are pulled.

2. Grouting is used for achiving the density of the soil. The Compaction grouting can be used to improve densification. The densification can be done above or below the foundation so that to improve soil around the foundation and reduce the settlement of soil. The grouting method for compaction is obtained when grout bulb of filler is pumped into the soil. The soil where it is to be strengthened is selected. The pump can be inserted in verticle or inclined position near the soil. The soil can be densified by grout bulb technique. The filler is not permeable and non reactive so that it can be acheived.

The other techiques such as using of compacting machines like rollers can be used. These compacting rollers involves sheep foot rollers, pneumatic rollers, simple rollers etc. Based on the type of soil rollers can be used.

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I | II **MID TERM EXAMINATION**

No. 990979 H.T. No. 1 8 2 4 1 A 0 1 B 8

Name of the Examination IV^th B. Tech., II^nd Sem., II^nd MID - Examination

Course Ground Improvement Techniques Branch Civil Engineering Date 05-05-2022

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	2½	2			2½	2½	2½	2½					14½

START WRITING FROM HERE

1@A STABILIZATION OF SOIL'S :

"Stabilization of Soil" mechanism help's in improving Soil properties by providing more shear strength, bearing capacity etc.

There are mainly 3-types of Soil Stabilization:

(i) Mechanical Stabilization (ii) Chemical Stabilizatio

(iii) Biological Stabilization (Eg MICP process)

→ Factor's Influencing the Mechanism of Stabilizati of Soil's are:

- Ground water Table
- Permeability & Drinage Condition's.

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- Index Properties of Soil: water content, void ratio, Liquid limit, shrinkage limit, Specific Gravity, Unit weight etc.
- Engineering Properties of Soil: Shear strength, Bearing Capacity, Permeability etc.
- Grain Size Distribution of Soil
- Properties of Additive used for stabilization and it's compatability with the soil will also influence the "Mechanism of Stabilization of Soil's"

2m

1(b)

LIME STABILIZATION	CEMENT STABILIZATION
→ Lime mixed with water can be used stabilization of Soil	→ Cement should be mixed with Soil directly (or) mixed with water.
→ Stabilization can be done by both liberation of Ca^{++} ion (or) without liberation	→ Stabilization is done by liberation of Calcium ion & by exchibiting Cementation properties

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→ Lime stabilization provides less strength in comparision with Cement stabilization	→ Cement stabilization have more strength as they fill the void's of ~~soil's~~ the Bind's the particles firmly.
→ It can have Permanent ~~as well as~~ ~~and~~ temporary changes in the soil	→ It ~~can~~ will bring permanent changes in the soil due to which can't use ~~the~~ it again for Cultivation of Crop's

2

3 (a) Role of Geo-synthetics in Protecting Soil from Contamination:

→ They provide Tensile strength which will reduce Landslides.

→ They will interlock the Layer's firmly

→ They are Non-Bio-degradable

→ They are made of Eco-friendly material

→ They provide more Stiffness

→ They helps in controlling the Permeability.

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In Cushioned foundation:

→ ~~After~~ We should excavate more than the required depth

→ Fill the extra-excavated depth with sand, cement, aggregates and silt mix

→ Above it construct the footing as per Design requirements

→ Sides of the footing column should be filled with sand, silt & aggregate mix

→ This will help in the taking various load's

→ And they will help the footing to be erect during soil expansion etc.

(2½)

4(a) & Applicability of Soil Nailing Mechanism:

~~Of Soil Reinforcement~~:

→ Reinforcement will help in holding the Soil & Facing layer together.

→ This method is ~~basically~~ mainly used to construct road's ~~for~~ between an

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I | II **MID TERM EXAMINATION**

No. 440372 H.T. No. 1 8 2 4 1 A 0 1 0 3

Name of the Examination IV-B.Tech, II semester, Mid-II Examination

Course B.Tech Branch Civil Date 05/05/2022

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	2½	2	1½				2						7

START WRITING FROM HERE

1)

a) Stabilization of soils :-

It is defined as to increase the shear strength of an existing soil to accomodate for design criteria of any structures on that soil.

→ stabilization itself define stability.

Mechanism of stabilization of soils.

→ stability of soils can done by NO of ways and different techniques which are appropriate (or) suitable for that soil different conditions.

2½ → Mechanism of stabilization of soils is done by mechanical and by chemicals. These will increase the shear stength and decrease the compresibility.

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cement stabilization:

→ It is applicable when soil is silt (or) clay.
→ when more void ratio present and stability is less, cement stabilization is done.
→ It is slight cost than lime.
→ Here cement, and soil particles of finely divided is mixed and pour into the soil present in ground.
→ these poured particles filled void ratio and from hardened concrete.

2) a) Earth Retaining structures :-

It is provided to restrain passive (or) lateral earth pressure.

various type of earth Retaining structures

i) Retaining walls for compounds
ii) Retaining walls for dams, bridges and roads construction
iii) Soil nailing.
iv) Walls to resist active and passive Earth pressure.

-Applications of Retaining structures

→ construction of roads excavations
→ dam wall to resist hydraulic pressure of water
→ In Railway network of bridges.
→ when loose soil is present in foundation.

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