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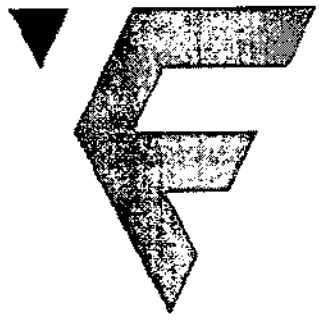
FABTECH TECHNICAL CAMPUS
COLLEGE OF ENGINEERING & RESEARCH, SANGOLA

(An Autonomous Institute)

Affiliated to Dr. Babasaheb Ambedkar Technological University (BATU), Lonere



In line with the

National Education Policy (NEP) 2020 Compliant

Curriculum

For

DEPARTMENT OF CIVIL ENGINEERING

Post Graduate Program

(Geotechnical Engineering)

First and Second Year M. Tech.

(Sem. I to Sem. IV)

(w.e.f. A.Y. 2025-26)

FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
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Curriculum for First Year M. Tech. with effect from A.Y. 2025-26

Semester I

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	**In Semester Evaluation Scheme**		**End Semester Evaluation Scheme**		*Total Marks*
			L	*T*	*P*		**MSE**	**ICA**	**ESE**	**OE/POE**	
							M	**M**	**M**	**M**	
PCC	25PCE11171	Advanced Soil Mechanics	3	-	-	3	30	10	60	-	100
	25PCE11172	Ground Improvement Methods	3	-	-	3	30	10	60	-	100
	25PCE11173	Geotechnical Exploration and Instrumentation	3	-	-	3	30	10	60	-	100
	25PCE11174	Experimental Geotechnics Lab	-	-	2	1	-	50	-	-	50
PEC	25PCE11271	Professional Elective-1	3	1	-	4	30	10	60	-	100
	25PCE11272										
	25PCE11273	Professional Elective-2	3	1	-	4	30	10	60	-	100
	25PCE11274										
ELC	25PME11671	Research methodology and IPR	3	1	-	4	30	10	60	-	100
ELC	25PCE11672	Seminar	-	-	2	1	-	50	-	-	50
AEC	25PEE11471	Hands on Research and Analysis Tool	-	-	2	1	-	50	-	-	50
		Total	**18**	**03**	**06**	**24**	**180**	**210**	**360**	**-**	**750**
			Abbreviations: L= Lecture, **T** = Tutorial, **P** = Practical, **M** = Marks								

*Students must complete a student induction program at the start of the first semester to ease their transition into the academic environment.

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Professional Electives- I & II

Sr. No.	Professional Elective	Course	Course Code
1.	Professional Elective- I	Earth & Rockfill Dams	25PCE11271
		Marine Geotechniques	25PCE11272
2.	Professional Elective- II	Unsaturated soil mechanics	25PCE11273
		Computational Methods in Geotechnical Engineering	25PCE11274

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Curriculum for First Year M. Tech. with effect from A.Y. 2025-26

Semester II

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	In Semester Evaluation Scheme		End Semester Evaluation Scheme		*Total Marks*
			L	*T*	*P*		MSE	ICA	ESE	OE/POE	
							M	M	M	M	
PCC	25PCE12175	Advanced Foundation Engineering	3	-	-	3	30	10	60	-	100
	25PCE12176	Soil Dynamics and Machine Foundations	3	-	-	3	30	10	60	-	100
	25PCE12177	Geo-environmental Engineering	3	-	-	3	30	10	60	-	100
	25PCE12178	Geotechnical Computational lab	-	-	2	1	-	50	-	-	50
PEC	25PCE12275	Professional Elective- III	3	1	-	4	30	10	60	-	100
	25PCE12276										
	25PCE12277	Professional Elective- IV	3	1	-	4	30	10	60	-	100
	25PCE12278										
VSE	25PCE12172	Mini Project	-	-	2	1	-	50	-	-	50
ELC	25PET12673	Research Publication and Ethics	-	-	4	2	-	50	-	-	50
		Total	**15**	**2**	**8**	**21**	**150**	**200**	**300**	**-**	**650**
			Abbreviations: L= Lecture, **T** = Tutorial, **P** = Practical, **M** = Marks								

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Professional Electives - III & IV

Sr. No.	Professional Elective	Course	Course Code
1.	Professional Elective- III	Soil Behaviour	25PCE12275
		Critical State Soil Mechanics	25PCE12276
2.	Professional Elective- IV	Earthquake Geotechnics	25PCE12277
		Geosynthetics Engineering	25PCE12278

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Semester III

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	**In Semester Evaluation Scheme**		**End Semester Evaluation Scheme**		*Total Marks*
			L	*T*	*P*		**MSE**	**ICA**	**ESE**	**OE/POE**	
							M	**M**	**M**	**M**	
PCC	26PCE21179	Soil Structure Interaction	3	-	-	3	30	10	60	-	100
ELC	-	MOOC's/NPTEL, Self Learning Courses/MKCL	2	-	-	2	-	50	-	-	50
OEC	26PCE21571	Open Elective Course	3	1	-	4	30	10	60	-	100
	26PCE21572										
	26PCE21573										
ELC	26PCC21675	Dissertation Phase - I	-	-	12	6	-	100	-	100	200
		Total	**8**	**1**	**12**	**15**	**60**	**170**	**120**	**100**	**450**
			Abbreviations: L= Lecture, **T** = Tutorial, **P** = Practical, **M** = Marks								

Open Elective Courses

Sr. No.	Course Code	Name of the Course
1.	26PCE21571	Business Analytics
2.	26PCE21572	Non-Conventional Energy
3.	26PCE21573	Organizational Behavior

Open MOOC / NPTEL Courses

Sr. No.	Course Code	Name of the Course
1.	26PCE21674A	Global Environmental Management (MOOC)
2.	26PCE21674B	Understanding the Marketplace (MKCL)
3.	26PCE21674C	Strength and Deformation Characteristics of Soil (NPTEL)
4	26PCE21674D	Plastic Waste Management (NPTEL)

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Semester IV

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	**In Semester Evaluation Scheme**		**End Semester Evaluation Scheme**		*Total Marks*
			L	*T*	*P*		**MSE**	**ICA**	**ESE**	**OE/POE**	
							M	**M**	**M**	**M**	
ELC	26PCC22676	Dissertation Phase - II	-	-	24	12	-	200	-	200	400
		Total	**-**	**-**	**24**	**12**	**-**	**200**	**-**	**200**	**400**
			Abbreviations: L= Lecture, **T** = Tutorial, **P** = Practical, **M** = Marks								

Type of courses	Description
PCC (1)	Programme Core Course
PEC (2)	Programme Elective Course
MDM (3)	Multidisciplinary Minor
OEC (5)	Open Elective Cource
REM	Research Methodology
VSE (7)	Vocational and Skill Enhancement Course
ELC (6)	Dissertation/Project/Internship
AEC (4)	Ability Enhancement Courses

* The first two digits represent the Calender year of the course when it was offered for the first time, next three letters represent the type of course, next digit represent the year of the course, next digit represents the semester of the year, next digit indicates code for the type of course, next digit indicates that it is PG course, ans the last digit indicates the sr. no of that type of course.

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Semester I

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First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Advanced Soil Mechanics (25PCE11171)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE :	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Characterization of soils and stress distribution in soils	BL-IV: Analyze
CO2	Analyze effective stresses in soils for different field conditions	BL-IV: Analyze
CO3	Apply three-dimensional consolidation theory for different geotechnical applications	BL-III: Applying
CO4	Find state of stresses at different stages of loading through stress paths	BL-I: Remember
CO5	Estimate pore pressure and Hvorslev shear strength parameters	BL-II: Understand

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction:** Introduction to soils, Deposition and Origin of natural soil, Complexity of soil nature, Soil Structure, Mineralogy and soil Water: Soil mineralogy and structure of clay minerals, classification of soils, Inter-particle forces in soils; Modes of occurrence of water in soils–Absorbed, Adsorbed, Double layer and Capillary water	07
Unit 2	**Stress distribution:** Types of stresses, Estimation of stresses in soils, Isobar and Pressure bulb, Variation of vertical stress under point load along the vertical and horizontal pleas, Newmark's Influence Chart	06
Unit 3	**Effective Stress:** The principle and nature of effective stress, Inter-granular pressure, Pore pressure, effective stress under different conditions, Hydrostatics, Vertical & lateral effective stress, Effective stress for partially saturated soils, Quick sand phenomenon	09
Unit 4	**Permeability:** Flow through Soils: Darcy's law, Hydraulic conductivity of soils, Steady and Transient flows, seepage analysis, Flow nets, Critical hydraulic gradient	07
Unit 5	**Consolidation:** Principle of consolidation-compressibility, Difference between compaction and consolidation, Pressure void ratio relationships, Settlement and Time rate for consolidation, Terzaghi's one dimensional consolidation parameters, Pre-consolidation pressure, Estimation of total Settlement. Two- and three-dimensional consolidation, Secondary compression, methods for accelerating the consolidation settlements, Sand and Wick drains.	11

Text Books:

1) Das, BM, Advanced Soil Mechanics, CRC Press, London & NewYork, 2020, 5thEdition. 2. Murthy
2) V.N.S, Soil Mechanics and Foundation Engineering, CBS publications, New Delhi, 2018.

Reference Books:	
1)	Gopal Ranjan and Rao ASR Basic and applied soil mechanics, , New age Publications, Delhi, 2016, 3rd Edition.
2)	Richard L Handy, Foundation Engineering – Geotechnical Principles & Practical applications, Mc Graw Hill, New York, 2020.
3)	Karl Terzaghi, Ralph B Peck, and Gholamreza Mesri, Soil Mechanics in Engineering Practice, Wiley, 2009, 3rd Edition.
4)	William Lamb and Robert V Whitman, Soil Mechanics, Wiley, 2012.
5)	Shashi K Gulhati and Majoj Dutta, Geotechnical Engineering, Mc Graw Hill, New Delhi, 2017.
6)	D.M. Wood, Soil Behaviour and Critical State Soil Mechanics, Cambridge University Press, 1994..
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	-	-	-	1	1	1	1	1
CO2	1	2	1	1	-	-	1	1	2	2	1	-
CO3	1	1	1	1	-	-	1	1	1	2	1	-
CO4	1	2	2	2	-	-	-	1	1	1	1	1
CO5	1	2	2	2	-	-	-	1	1	1	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

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First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Ground Improvement Method (25PCE11172)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Identify solutions for difficult ground conditions in engineering practice	BL-I: Remember
CO2	Comprehend different ground improvement techniques	BL-II: Understand
CO3	Propose site specific method of improvement and its design	BL-V: Evaluate
CO4	Promote wider use of techno–economical construction techniques such as soil nailing and confinement methods.	BL-III: Applying
CO5	Decide effective alternate techniques for soft soil problems	BL-II: Understand

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction to Ground Modification:** Need and objectives of Ground Improvement, Classification of, Ground Modification Techniques – suitability and feasibility, Emerging Trends in ground improvement	07
Unit 2	**Mechanical Modification:** Methods of compaction, Shallow compaction, Deep compaction techniques – Vibro-floatation, Blasting, Dynamic consolidation, pre-compression and compaction piles, Field compaction control and geomaterial replacement concept.	08
Unit 3	**Hydraulic Modification:** Methods of dewatering – open sumps and ditches, Well-point system, Electroosmosis, Vacuum dewatering wells; pre-loading without and with sand drains, strip drains and rope drains, vertical drains.	10
Unit 4	**Admixture Stabilization:** Stabilization with admixtures like cement, lime, calcium chloride, fly ash and bitumen, Grouting: Categories of grouting, Art of grouting, Grout materials, Grouting techniques and control	07
Unit 5	**Reinforced Earth Technology:** Concept of soil reinforcement, reinforcing materials, Backfill criteria, art of reinforced earth technology, Design and construction of reinforced earth structures, soil nailing	07

Text Books:

1) Manfred R. Haussmann, Engineering principles of ground modification, Pearson Education Inc. New Delhi. 2008.

2) Bell, F.G. E and FN Spon, Engineering Treatment of Soils, New York, 2006.

Reference Books:

1) Jie Han, Principles and Practice of Ground Improvement, John Wiley & Sons, Inc.,2007.

2) Anjan Patel, Geotechnical Investigations and Improvement of Ground Conditions, Woodhead Publishing Series in Civil and Structural Engineering, 2006, 1st Edition.

3)	Purushothama Raj P, Ground Improvement Techniques, Laxmi Publications (P) Limited, 2006. 4.
4)	Klaus Kirsch and Alan Bell, Ground Improvement, 2004, 3rd Edition
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	-	-	-	2	1	2	1	1
CO2	1	2	2	1	-	1	1	2	1	2	1	1
CO3	2	2	2	1	-	1	1	2	1	2	1	1
CO4	1	2	2	1	1	1	1	2	1	2	1	1
CO5	2	2	2	1	-	1	1	2	1	2	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

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First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Geotechnical Exploration and Instrumentation (25PCE11173)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	3	3	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Implement various exploration methods in soil and rock	BL-III: Applying
CO2	Prepare bore log for sub-soil strata	BL-III: Applying
CO3	Apply relevant instrumentation for Geotechnical Engineering works	BL-III: Applying
CO4	Interpret field and laboratory data and prepare soil investigation report	BL-III: Applying
CO5	Know about visual identification tests	BL-III: Understanding

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Introduction:** Soil Formation, types of soils, physical and chemical weathering, soil transport, Deposition and stratification phenomena and Soil Classification.	07
Unit 2	**Methods of Soil Exploration:** Methods of Boring, Auguring and Drilling, Machinery used for drilling, types of augers and their usage for various projects.	07
Unit 3	**Soil Sampling:** Sampling methods, types of samples, storage of samples and their transport. Sample preparation, Sample sizes, types of sampler's specifications for testing.	07
Unit 4	**Borehole Logging:** Logging of Boreholes - logging methods - Groundwater observations – Water table fluctuations and Effects - Preparation of soil profiles and exploration report.	07
Unit 5	**Filed Testing of Soils:** Methods and specifications – visual identification tests, standard penetration test (SPT), plate load test (PLT), pressuremeter test (PMT) Dilatometer test (DMT) vane shear test (VST), Cone penetration test (CPT), Becker penetration test (BPT), analysis of test results. Geophysical methods of soil exploration- seismic refraction, electrical resistivity, cross hole test.	11

Text Books:

1) Clayton C. R., Matthews M. C and Simons N. E., Site Investigation, Blackwell Science. 2005
2) John Dunn cliff, Geotechnical Instrumentation for Monitoring Field Performance, WileyInterscience, 2008

Reference Books:

1) Muni Budha, Soil mechanics and Foundation Engineering, John Wiley and sons, 2010, 3rd Edition.
2) M. D. Desai, Ground Property Characterization from In-Situ Testing, IGS-Surat Chapter, 2005
3) A.S. Rao and Gopal Ranjan, Basic and Applied Soil Mechanics, New Age International.

4)	IS:1892-Code of Practice for subsurface investigation for foundation, 1979.
5)	IS:4453-Subsurface Exploration by Pits, Trenches, Drifts and Shafts - Code of Practice, 2009.
Mid Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	-	2	-	1	-	-	-	1
CO2	1	-	-	-	-	1	-	-	-	-	-	-
CO3	1	1	1	1	-	2	-	1	-	-	-	1
CO4	2	-	-	-	-	2	-	-	-	3	-	-
CO5	1	1	1	1	-	2	-	1	-	-	-	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

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First Year B. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Experimental Geotechnics Lab (25PCE11174)

Teaching Scheme:			**Evaluation Scheme:**	
	No. of Hrs./week	**No. of Credits**		
Lectures:	-	-	**MSE:**	-
Tutorials:	-	-	**ICA:**	50 Marks
Practical:	02	01	**ESE:**	-
Total:	02	01	**OE/POE/ICA:**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO 1	Appraise the index and Engineering properties of soils	BL-IV: Analyze
CO 2	Determine shear strength parameters under different drainage conditions and find out the critical void ratio of sand	BL-III: Applying
CO 3	Assess the swell parameters of expansive clays	BL-IV: Evaluating
CO 4	Comprehend standard penetration test, plate and pile load tests	BL-II: Understand
CO 5	Perform the field tests on soils	BL-III: Applying

Ex.	***Experiment Details***	***No. of Ex. Sessions (Hrs.)***
Ex. 1	To find index properties of soils	6
Ex. 2	To determine engineering properties of soils	6
Ex. 3	To perform consolidation and swell tests on soils	4
Ex. 4	To perform shear strength tests on soils	4
Ex. 5	To perform field tests on soils	6

Internal ContinuousAssessment (ICA):

ICA marks are calculated based on students' attendance during practical's and performance during laboratory sessions (at least six activities/ exercises should be performed from the list provided above).

The strength of mapping is to be written as 1: low, 2: Medium, 3: High.

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	1	-	-	-	1	-	1	-	1
CO2	1	1	-	1	-	-	-	1	-	1	-	1
CO3	1	2	-	-	2	1	1	2	1	1	-	1
CO4	1	2	-	-	2	1	1	2	1	1	-	1
CO5	1	-	-	-	2	1	1	1	-	1	-	1

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First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Earth & Rockfill Dams (25PCE11271)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Design of the various earth and rock fill dam components like freeboard, top width etc.	BL-V: Evaluating
CO2	Analyses the seepage of the earth dams and design of the filters	BL-IV: Analyze
CO3	Interpret field and laboratory data and prepare soil investigation report	BL-III: Applying
CO4	Provide remedies for maintenance of the dams against various types of failures	BL-III: Applying
CO5	Determination of critical slip circle	BL-III: Applying

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction:** Classification of dams; Site selection; Preliminary section; Types of earth and rockfill dams.	08
Unit 2	**Failures and Damages of Earth Dams:** Nature of failures – hydraulic, seepage and structural failures; Piping; settlement; slides; earthquake & miscellaneous damages; case studies	08
Unit 3	**Design and Construction of Earth Dam Components:** Basic design requirements; Free board design; Top width design: Slope erosion protection; Construction of earth dams- soil types, methods, equipment	10
Unit 4	**Seepage:** Fundamentals of seepage flow- Darcy's law and Laplace's equation; Flow nets and its use; Phreatic line determination; Seepage control through dam section- impervious core, drains, filters; Design of filters; Seepage control through dam foundation- various impervious cut offs, upstream blanket, relief wells, drainage trenches, downstream loading berm; Sand boiling.	12
Unit 5	**Slope Stability & Rock fill Dam:** Fundamentals of slope failures; Types; Critical slip surfaces, Determination of critical slip circle; Factor of Safety; Strength parameters; Pore pressure consideration at slope; Taylor's stability charts; Ordinary method of slices; Bishop's method; Janbu's method; Morgenstern method. General characteristics and components; Rockfill materials; Construction; Design	12

Text Books:

1) B Singh, R S Varshney, Embankment Dam Engineering, Nem Chand & Bros, 2004
2) H D Sharma, Embankment Dams, Oxford & IBH Publishing Company, 1991

Reference Books:	
1)	S K Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, 2003
2)	C Kutzner, Earth and Rockfill Dams: Principles for Design and Construction, Routledge, 1997
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	3	-	-	-	1	2	1	1	1
CO2	1	1	1	1	1	-	1	1	-	-	1	-
CO3	1	-	1	2	-	1	2	1	-	2	-	1
CO4	1	-	-	2	1	2	1	1	-	1	-	1
CO5	-	2	1	-	1	1	1	1	1	1	-	2

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
(An Autonomous Institute)

First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Marine Geotechniques (25PCE11272)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Identify the marine soil deposits along the coast lines	BL-II: Understand
CO2	Comprehend Geotechnical challenges of marine sediments	BL-II: Understand
CO3	Select suitable marine foundations for offshore structures	BL-IV: Analyze
CO4	Analyze behaviour of marine soil deposits under cyclic loading condition	BL-IV: Analyze
CO5	Know about numerical modeling of marine Foundations	BL-II: Understand

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Marine soil deposits:** Offshore environment, Offshore structures and foundations, Specific problems related to marine soil deposits, Physical and engineering properties of marine soils	08
Unit 2	**Behavior of Soils Subjected to Repeated Loading:** Effect of wave loading on offshore foundations, Behavior of sands and clays under cyclic loading, Laboratory experiments including repeated loading, Cyclic behavior of soils based on fundamental theory of mechanics, Approximate engineering methods which can be used for practical cases	12
Unit 3	**Site Investigation of Marine Soil Deposits:** Challenges of site investigation in marine environment, Different site investigation techniques, Sampling techniques, Recent advancements in site investigation and sampling used for marine soil deposits	10
Unit 4	**Foundations in Marine Soil Deposits:** Embankments in soft soils, Different offshore and near shore foundations, Gravity platforms, Jack-up rigs, pile foundations. caissons, spudcans	08
Unit 5	**Numerical Modeling of Marine Foundations:** Subjected to Wave Loading: Numerical modeling of cyclic behavior of soils, empirical models, Elastic-plastic models, FEM analysis of marine foundations subjected to wave loading	10

Text Books:

1) Randolph M. and Susan G., Offshore Geotechnical Engineering, CRC Press, 2017, 1st Edition

2) Thompson D. and Beasley D. J., Handbook of Marine Geotechnical Engineering, Military Bookshop; 2012, Illustrated edition.

Reference Books:

1) Robert. M. Koerner., Handbook of Marine Geotechnical Engineering, Xlibris, 2012, 6th Edition

2)	Military Soils Engineering: The Official U.S. Army / U.S. Marine Corps Technical Manual TM 3-34.6/ McRp 3-17.7g, 2012
3)	Mark R. and Susan G., Offshore Geotechnical Engineering, CRC Press, 2011, 1st Edition.
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	1	1	-	-	-	-	1
CO2	1	1	2	1	1	1	1	-	1	1	1	1
CO3	1	1	2	1	-	2	1	-	-	-	1	2
CO4	1	-	-	2	-	-	1	-	1	1	-	1
CO5	1	1	2	1	2	1	1	-	1	1	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Unsaturated Soil Mechanics (25PCE11273)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE:**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Interpret the Soil Water Characteristic Curve	BL-III: Applying
CO2	Comprehend the unsaturated flow	BL-II: Understand
CO3	Analyze the stress state variables	BL-IV: Analyze
CO4	Apply the unsaturated strength behaviour to Engineering structures	BL-III: Applying
CO5	Predict volume change behavior of soils	BL-III: Applying

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Introduction:** Unsaturated soil, Gravimetric and Volumetric water content, Pore water pressure, Matric and Osmotic suction, Soil Water Characteristic Curve (SWCC), Hysteresis in SWCC, Methods to determine SWCC	10
Unit 2	**Seepage in unsaturated soil:** Permeability and Hydraulic Conductivity, Hydraulic Conductivity Function (HCF), One-dimensional steady state flow, Darcy's and Gardner's Principles, Transient Flow, Infiltration, Numerical Modelling, Capillary Barriers.	10
Unit 3	**Introduction of unsaturated soil:** Extended Mohr Coulomb's criterion, Shear strength and pore pressure parameters, Measurements of unsaturated shear strength parameters	10
Unit 4	**Strength characteristics of unsaturated soil:** Unsaturated shear strength models, Applications in Bearing Capacity, Lateral Earth Pressure, and Slope stability in Unsaturated soils	08
Unit 5	**Volume Change behavior of soils:** Stress state variables for unsaturated soils, Stress Deformation Behavior, Volumetric continuity, Volume-Mass Constitutive Relations, Swelling and Collapse behavior.	10

Text Book:

1) Ning Lu and William J. Likos, Unsaturated Soil Mechanics, John Wiley & Sons Inc., 2004

2) Murray E. J. and Shivakumar V., Unsaturated Soils: A fundamental interpretation of soil behaviour, Wiley-Blackwell, 2010, 1st edition.

Reference Books:

1) Charles W. W. Ng, and Menzies B., Advanced Unsaturated Soil Mechanics and Engineering, CRC Press, 2007, 1 st edition (Reprint 2019)

2) Fredlund D. G. and Rahardjo H., Soil Mechanics for Unsaturated Soils, John Wiley & Sons Inc.,

	1993, 1st edition
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	-	-	-	2	1	1	-	-	1	2
CO2	1	-	-	-	-	2	1	1	-	-	1	2
CO3	1	-	1	-	-	2	1	1	-	-	1	2
CO4	1	-	-	1	-	1	1	1	-	-	1	2
CO5	1	1	-	-	-	2	1	1	-	-	1	2

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Computational Methods in Geotechnical Engineering (25PCE11274)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Solve linear and non-linear equations using numerical techniques.	BL-III: Applying
CO2	Apply the basic concepts of tensor algebra and calculus in continuum mechanics problems.	BL-III: Applying
CO3	Analyze the behaviour of geotechnical structures using finite difference and finite element methods.	BL-IV: Analyze
CO4	Apply the constitutive modeling in Geomechanics.	BL-III: Applying
CO5	Apply the knowledge of critical state soil mechanics	BL-III: Applying

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Solution of Non-linear and Linear Equations:** Bisection, False Position, Newton-Raphson, Jacobi's , Gauss Seidel method	10
Unit 2	**Solution of ODE using numerical techniques**: Initial value problems and boundary value problems; Taylor series method, Picard's method, Euler's method, Runge-Kutta method	10
Unit 3	**Finite Difference Method:** Boundary value and Initial value problems - Dirichlet conditions, Neumann conditions; Ordinary and partial differential equations; Non-linear problems	10
Unit 4	**Introduction to Finite Element Method:** Formulation of weak form, interpolation functions	08
Unit5	**Constitutive modelling of soil:** Critical state soil mechanics: Elastic-plastic constitutive models; Cam	10

Text Book:

1) Jain M K, Iyengar SRK and Jain R K,Numerical Methods for Scientific and Engineering computations, New Age International (P) Ltd. Publishers, New Delhi, 2012, 3rd edition.

2) Naylor D J and Pande G N, Finite Elements in Geotechnical Engineering, Pineridge Press Ltd., UK, 1981.

Reference Books:

1) C S Desai and JT Christian, Mc Numerical Methods in Geotechnical Engineering. Graw Hill, 1977.

2) Y. M. Cheng, J. H. Wang, Li Liang, W. H. Fung, W. H. Fung Ivan, Numerical Methods and Implementation in Geotechnical Engineering, 2020.

In Semester Examination (MSE):

MSE shall be based upon student's performance in three tests conducted and evaluated at institute level

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	1	-	-	-	-	-	-	-	1
CO2	1	2	2	-	-	-	-	-	-	1	1	1
CO3	1	1	2	1	-	-	-	-	2	1	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Research Methodology and IPR (25PME11671)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	2	2	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	2	2	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Discuss research methodology and the technique of defining a research problem	BL-II: Understand
CO2	Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review.	BL-II: Understand
CO3	Explain various research designs, sampling designs, measurement and scaling techniques and also different methods of data collections.	BL-II: Understand
CO4	Explain several parametric tests of hypotheses, Chi-square test, art of interpretation and writing research reports	BL-II: Understand
CO5	Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading International Instruments concerning IPR.	BL-II: Understand

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.	5
Unit 2	**Defining the Research Problem:** Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.	5
Unit 3	**Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Design, Introduction, Sample Design, Sampling and Nonsampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs.	5
Unit 4	**Data Collection:** Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method, Meaning of Interpretation, Technique of	5

	Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports	
Unit 5	**Intellectual Property:** The Concept, Intellectual Property System in India, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999,The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act1999, Copyright Act,1957,Trade Names, copyrights	6
Text Book:		
1)	Research Methodology: C R Kothari, Viswa Prakasam Publication, 2014.	
2)	Research Methods: M M Munshi & K Gayathri Reddy, HPH, 2015.	
Reference Books:		
1)	Research Methods: the concise knowledge base, Trochim, Atomic Dog Publishing, 2005.	
2)	Conducting Research Literature Reviews: From the Internet to Paper, Fink A, Sage Publications, 2009.	
In Semester Examination (MSE):		
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level		

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	1	1	-	1	1	1	1
CO2	1	-	-	-	-	1	-	1	-	1	-	1
CO3	1	-	1	-	1	1	-	-	-	2	1	1
CO4	-	1	-	-	-	-	-	1	-	2	-	1
CO5	1	2	1	2	-	1	1	1	-	3	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Hands on Research & Analysis Tool (25PEE11471)

Teaching Scheme:			**Evaluation Scheme:**	
	No. of Hrs./week	**No. of Credits**		
Lectures:	-	-	**MSE:**	-
Tutorials:	-	-	**ICA:**	50 Marks
Practical:	2	1	**ESE:**	-
Total:	2	1	**OE/POE:**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO 1	Apply analytical and numerical methods using tools like MATLAB, Python, and simulation software to model and solve basic engineering and research problems.	BL- 3,4
CO 2	Demonstrate proficiency in using modern research tools, including LaTeX, reference managers, optimization platforms, and AI-based tools for effective technical documentation and research exploration.	BL-3,6

Course Description- This course offers hands-on experience through small, assignment-based activities using various research and analysis tools. The content is organized into modules, each requiring specific prerequisite knowledge to effectively complete the associated practical sessions. Students will be introduced to widely used research tools and their applications, enabling them to explore the field of research with the foundational knowledge gained from this course.

Ex.	**Experiment Details**	No. of Ex. Sessions (hrs.)
Ex. 1	Assignment on analytical modeling using MATLAB or any equivalent software	04
Ex. 2	Implementation of any one numerical method using Python	02
Ex. 3	A case study on basic simulations using any one analysis Software	06
Ex. 4	Hands on with LATEX word processing software	04
Ex. 5	Hands on reference manager Tools	02
Ex. 6	Assignment on AI research Tools	02
Ex. 7	Introduction to any one optimization tool	02

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	1	1	-	1	1	1	1
CO2	1	-	-	-	-	1	-	1	-	1	-	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

Semester II

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Advanced Foundation Engineering (25PCE12175)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Select different types of foundations based on site conditions	BL-II: Understand
CO2	Analyze bearing capacity and settlement of foundations.	BL-IV: Analyze
CO3	Design shallow and deep foundations	BL-V Evaluating
CO4	Analyze and suggest remedial measures against foundation failures	BL-IV: Analyze
CO5	Select special foundations for the problematic soils	BL-II: Understand

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Art of Foundation Engineering:** Bearing Capacity - Theories of Terzaghi, Meyerhof, Brinch Hansen, Vesic and Skempton, Penetration tests, Plate load tests, Factors; Settlement Analysis - Stresses in soil, Calculation of settlement and bearing capacity for different ground conditions, control of excessive settlements	09
Unit 2	**Foundations:** Foundation classification; Choice of foundations; Shallow Foundations - Isolated (individual and combined foundations), Raft foundations - Necessity; Types of rafts; Bearing capacity and settlement of rafts – Beams on elastic foundations	09
Unit 3	**Pile Foundations:** Classification and Uses, carrying capacity of Single pile, Pile load tests, cyclic pile load test, pull out resistance, laterally loaded Piles; Pile groups - Group efficiency, Settlement of single pile and pile groups, Negative skin friction, sharing of loads	09
Unit 4	**Well Foundations** : Caissons – Types, advantages and disadvantages, Shapes and component parts, Grip length, Bearing capacity and settlement, Forces acting, Sinking of wells, Rectification of Tilts and Shifts, Lateral stability - Terzaghi's method and IRC method	10
Unit 5	**Design of Shallow and Deep Foundations**: Soil pressure for structural design; Bending moment and shear force calculations, Conventional structural design of continuous footings, Individual footings-Eccentrically loaded footings; combined footings; Pile foundations - Structural design of pile foundations including pile caps; Design of pile groups	12

Text Books:

1) Braja M Das, Principles of Foundation Engineering, Cengage Learning, Inc, 9th Edition.

2)	Bowles J. E., Foundation Analysis & Design, Mc.Graw Hill Book Co.,2017.
Reference Books:	
1)	Donald P Coduto, Foundation Design: Principles and Practices, Pearson Education India, 2014.
2)	R. Salgado, The engineering of Foundations, Mc Graw Hill, 2006
3)	Teng W. C., "Foundation Design", Prentice Hall of India Ltd., 1962
4)	Tomlinson, "Foundation Design and Construction", Pearson Publications, 2001
5)	Satyendra Mittal, "Pile foundation design and construction", 2nd Edition, CBS Publishers & Distributors Pvt. Ltd., 2017
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	1	1	1	-	1	1
CO2	1	1	1	1	-	-	1	1	-	-	1	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1
CO4	1-	-	1	-	1	1	1	2	1	1	2	1
CO5	1	1	1	2	-	2	-	1	-	1	2	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Soil Dynamics and Machine Foundations (25PCE12176)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	4	4	**MSE:**	30 Marks
Tutorials:	-	-	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Apply theory of vibrations to solve dynamic problems	BL-III: Applying
CO2	Determine the dynamic properties of soils using laboratory and field tests	BL-II: Understand
CO3	Design the reciprocating and rotating machine foundations	BL-V Evaluating
CO4	Design various vibration isolation systems	BL-V Evaluating

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Theory of Vibrations:** Basics of dynamic system; Types of dynamic loads and solutions; Simple harmonic motion; Free vibration of single degree of freedom systems; Logarithmic decrement; Forced vibration of single degree of freedom under frequency dependent and frequency independent loading , Transmissibility; Bandwidth method; Vibration measuring instruments; Forced vibration of two-degree freedom system	12
Unit 2	**Dynamic Soil Properties:** Elastic constants of soil; Damping of soil; General factors affecting shear modulus and damping; Field tests- cyclic plate load test, block vibration test, standard penetration test, seismic bore hole surveys, Wave propagation tests; Laboratory tests- resonant column test, cyclic simple shear test, cyclic torsional shear test, cyclic triaxial test.	12
Unit 3	**Machine Foundations:** General principles of machine foundation design, Types of machines and foundations, General design requirements of machine foundation with codal provisions, Modes of vibration; Design of block foundations under reciprocating and rotating machines- elastic half-space method, linear elastic weightless spring method.	12
Unit 4	**Vibration Isolation:** Introduction, Active and passive isolation, Methods and design of vibration isolation systems	12

Text Books:

1) S Prakash and V K Puri, Foundations for Machines: Analysis and Design, Wiley, 1988
2) S Saran, Soil Dynamics and Machine Foundations, Galgotia Publications Pvt Ltd, 1999

Reference Books:

1) B M Das and G V Ramana, Principles of Soil Dynamics, Cengage Engineering, 2014
2) B B Prasad, Fundamentals of Soil Dynamics and Earthquake Engineering, PHI, 2013

In Semester Examination (MSE):

MSE shall be based upon student's performance in three tests conducted and evaluated at institute level

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	1	1	-	-	1	-	1	1
CO2	-	1	1	1	-	-	-	1	2	1	1	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1
CO4	1	2	2	2	1	1	1	1	1	1	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Geo-environmental Engineering (25PCE12177)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE :	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Assess possible reasons for susceptibility of soil properties to Environmental effects	BL-V Evaluating
CO2	Identify contaminant transport mechanisms	BL-II: Understand
CO3	Assess chemical interaction effect on Engineering behaviour of soils	BL-V Evaluating
CO4	Apply contaminant specific stabilization techniques	BL-III: Applying
CO5	Assess soil modification by environmental changes	BL-V Evaluating

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction:** Clay water interactions, Causes of soil deterioration, Scope and importance of environmental geotechniques	7
Unit 2	**Ground Contamination:** Sources of contamination, chemical diffusion in soils, practical range of flow parameters, simultaneous flow of water, Flow laws and relationships, current and salts through a soil, Electrokinetic phenomenon, coupled influences on chemical flow, chemical compatibility and hydraulic conductivity.	7
Unit 3	**Classification of Soil and Susceptibility to Environment:** Susceptibility to environment, mineralogy, formation and iso-morphous substitution, Factors affecting surface activity of soil, Ion-exchange and its mechanics, Theories of ion-exchange, clay-organic interactions, Mechanisms controlling the index properties of fine-grained soils.	8
Unit 4	**Engineering Properties of Soil due to Changing Environment:** Engineering properties and environment, Permeability and its mechanisms, volume change behaviour, Basic mechanisms controlling compressibility, Quasi pre-compression, compression behaviour of saturated Kaolinitic and Montmorillonitic clays with different pore fluids, Deformation behavior, shear strength, Behaviour of Kaolinitic and Montmorillonitic clays with different pore fluids, components of shear strength and their mechanisms	9
Unit 5	**Soil Modification by Environmental Changes:** Mitigating acid and alkali contamination in soils by use of additives; effect of lime on sulphate bearing clays; Effect of phosphoric acid, fly ash, hydroxy-aluminium and chemicals in clay stabilization	8

Text Books:	
1)	James K. Mitchell and Kenichi Soga, Fundamentals of Soil Behavior, John Wiley &Sons, Inc. New York, 3rd Edition, 2014.
2)	R W Sarsby, Environmental Geotechnics, Thomas Telford, 2000
Reference Books:	
1)	Claudio Cameselle, Jeffrey A. Adams, and Krishna R. Reddy., Sustainable Engineering: Drivers, Metrics, Tools, and Applications, Wiley, 2019.
2)	Laxmi N Reddy, Hilary N Inyang, Geo-Environmental Engineering – Principles and Foundations, CRC Press, 1st Edition, 2000.
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	-	-	3	1	1	1	1	1
CO2	1	1	-	2	1	1	3	1	2	1	1	1
CO3	1	1	-	-	-	1	2	1	1	1	1	1
CO4	1	2	1	1	1	1	2	1	1	1	-	1
CO5	1	-	-	-	1	1	1	1	-	-	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Geotechnical Computational Lab (25PCE12178)

Teaching Scheme:			**Evaluation Scheme:**	
	No. of Hrs./week	**No. of Credits**		
Lectures:	-	-	**MSE:**	-
Tutorials:	-	-	**ICA:**	50 Marks
Practical:	02	01	**ESE:**	-
Total:	02	01	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO 1	Use LATEX for documentation and Origin for plotting graphs	BL-III: Applying
CO 2	Write programs using MATLAB and apply them for engineering applications	BL-II: Understand
CO 3	Use with PLAXIS-3D and finite difference software and other packages.	BL-III: Applying
CO 4	Analyze slope by using analytical and numerical software packages	BL-IV: Analyze

Ex.	***Experiment Details***	***No. of Ex. Sessions (Hrs.)***
Ex. 1	Data processing and graphical presentation	2
Ex. 2	Documentation using LATEX	2
Ex. 3	Mathematical and statistical packages	2
Ex. 4	Finite Element Analysis	2

Internal Continuous Evaluation (ICA):

ICA marks are calculated based on students' attendance during theory lectures and performance in at least five assignments.

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	2	-	-	-	-	-	-	1
CO2	1	1	1	-	3	1	1	2	1	1	1	2
CO3	1	1	1	2	3	1	-	1	1	3	-	1
CO4	1	1	-	1	3	1	1	1	-	1	-	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Soil Behavior (25PCE12275)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE :	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Comprehend the formation mechanisms and the importance of soil mineralogy	BL-II: Understand
CO2	Identify basic mechanisms of soil behaviour under varying Environmental conditions	BL-II: Understand
CO3	Interpret the soil fabric and structure using XRD and SEM	BL-IV: Analyze
CO4	Interpret the mechanisms of volume change and strength characteristics	BL-IV: Analyze

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Soil formation:** Origin of clay minerals, Geological cycle, sediment erosion, transport and deposition; clay mineral types and their importance in geotechnical engineering; gravel, sand and silt particles;	06
Unit 2	**Mineralogy:** Determination of soil composition, Methods for compositional analysis, X-Ray diffraction, Scanning Electron Microscope	06
Unit 3	**Soil fabric:** Fabrics and fabric elements, contact force characterization	08
Unit 4	**Soil fabric measurement:** voids and their distribution, pore size distribution analysis, methods of fabric characterization	08
Unit 5	**Clay-water interactions:** Properties of adsorbed water; clay-water-electrolyte system, diffuse double layer theory; cation exchange, Energy and force of repulsion, Soil-chemical interactions, Volume change, shear strength and deformation behaviour: General volume change behaviour of soils, fabric, structure and volume change; General characteristics of strength and deformation, fabric, structure and strength; friction and physical interactions among soil particles	10

Text Books:

1) Mitchell J.K. and Kenichi Soga, "Fundamentals of Soil Behavior", John Wiley & Sons Inc., Third Edition, 2014.

2) Karl Terzaghi, Ralph. B Peck, Gholamreza Mesri, "Soil Mechanics in Engineering Practice", Wiley India., Third Edition, 2010.

Reference Books:

1) Malcom D. Bolton, "A Guide to Soil Mechanics", University Press (India) Pvt. Ltd., 2003.

2) Nyle C. Brady and Ray R. Weil, "The Nature and Properties of Soils", Pearson Education Inc., 2002

In Semester Examination (MSE):

MSE shall be based upon student's performance in three tests conducted and evaluated at institute level

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	-	-	3	1	1	1	1	1
CO2	1	1	-	2	1	1	3	1	2	1	1	1
CO3	1	1	-	-	-	1	2	1	1	1	1	1
CO4	1	2	1	1	1	1	2	1	1	1	-	1
CO5	1	-	-	-	1	1	1	1	-	-	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Critical State Soil Mechanics (25PCE12276)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	**MSE:**	30 Marks
Tutorials:	1	1	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Demonstrate basic mechanisms behind index properties and tests on soil	BL-III: Applying
CO2	Relate behaviour of soils subjected to different loading and drainage conditions within unified framework of critical state soil mechanics	BL-V: Evaluation
CO3	Apply theory of elasticity and plasticity to characterize the stress – strain behaviour of soils	BL-III: Applying
CO4	Formulate constitutive models based on critical state soil mechanics concepts	BL-V: Evaluation
CO5		

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**General soil tests:** Critical state model, interpretation of index test data, Mohr–Coulomb failure criterion, One–dimensional compression, undrained shear strength, general states of stress, pore pressure parameters.	07
Unit 2	**Stress and strain:** Stress and Strain paths and invariants, Critical state line, families of Undrained and Drained tests, Undrained and Drained planes, The Roscoe surface, Roscoe surface as a state boundary surface	07
Unit 3	**Behaviour of Over-consolidated samples:** Hvorslev surface, critical state line, complete state boundary surface, volume changes and pore pressure changes, behaviour of sands, effect of dilation	08
Unit 4	**Behaviour of Sands:** The critical state line for sands, Normalized plots, the effect of dilation, Consequences of Taylor's model	08
Unit 5	**Soil behaviour before failure:** Elastic and plastic deformations, Plasticity theory, Development of elastic- plastic model based on critical state soil mechanics, cam-clay, critical states and yielding of cam–clay, compression of cam–clay.	09

Text Books:

1) Azizi F, E & FN Spon, Applied Analysis in Geotechnics, London, 2000.
2) Atkinson J H and Bransby P L, The Mechanics of Soils – An Introduction to Critical State Soil Mechanics, McGraw-Hill Book Company Limited, London, 1982

Reference Books:

1) Azizi F, Engineering Design in Geotechnics, 2013
2) Wood D M, Soil Behaviour and Critical state Soil Mechanics, Cambridge University Press, New York, 1990.

In Semester Examination (MSE):

MSE shall be based upon student's performance in three tests conducted and evaluated at institute level

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2	-	-	-	1	1	1	1	1
CO2	1	2	1	1	-	-	1	1	2	2	1	-
CO3	2	2	1	1	-	-	2	1	1	2	1	-
CO4	1	2	2	2	-	-	-	1	1	1	1	1
CO5	1	2	2	2	-	-	-	1	1	1	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Earthquake Geotechnics (25PCE12277)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	**MSE:**	30 Marks
Tutorials:	1	1	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE:**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Estimate the size of earthquake and the strong ground motion parameters	BL-II: Understand
CO2	Conduct deterministic and probabilistic seismic hazard analysis	BL-III: Applying
CO3	Perform site specific ground response analysis.	BL-III: Applying
CO4	Analyze the liquefaction susceptibility of a site.	BL-IV: Analyze
CO5	Design earthquake resistant Geo-structures.	BL-III: Applying

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Seismology and Earthquakes:** Seismic waves and their properties, Interior of earth, Theory of plate tectonics, Plate boundaries, Faults and their properties, Elastic Rebound Theory, Determination of epicenter, Intensity and Magnitude, Magnitude scales	7
Unit 2	**Earthquake Hazards and Evaluation:** Strong ground motion parameters, Amplitude, Frequency content, duration, Estimation of ground motion parameters, Deterministic Seismic Hazard Analysis, Probabilistic Seismic Hazard Analysis	9
Unit 3	**Ground Response Analysis:** Kinematics of earthquake wave propagation from source to site, Dynamic soil properties, One-dimensional ground response analysis, Two and three-dimensional ground response analysis. Local site effects, Design earthquakes and design spectra, Introduction to earthquake resistant design	8
Unit 4	**Liquefaction**: Concepts of liquefaction, critical state line, steady state line, Factors affecting liquefaction potential, Cyclic shear stress, cyclic stress ratio, Laboratory determination of liquefaction potential, cyclic resistance ratio and its determination using field and laboratory experiments, Factor of safety against liquefaction	8
Unit 5	**Earthquake Resistant Design:** Analysis for Earthquake Loads: IS:1893-2002 Coefficient method	7

Text Books:

1) S.L., Kramer, Geotechnical Earthquake Engineering, Pearson Education, 2003
2) Towhata, Geotechnical Earthquake Engineering, Springer, 2008
3) R.W., Day, Geotechnical Earthquake Engineering Handbook, Mc Graw Hill, 2003

In Semester Examination (MSE):
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2	3	1	2	1	1	1	1	1
CO2	1	-	-	-	2	1	1	2	1	1	1	1
CO3	1	1	1	1	2	1	1	1	1	1	1	1
CO4	1	2	1	1	2	-	1	1	1	1	1	1
CO5	1	1	2	3	1	1	-	1	1	-	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Geosynthetics Engineering (25PCE12278)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	**MSE:**	30 Marks
Tutorials:	1	1	**ICA:**	10 Marks
Practical:	-	-	**ESE:**	60 Marks
Total:	4	4	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO1	Select suitable geosynthetic materials for the intended purpose.	BL-II: Understand
CO2	Evaluate the properties of geosynthetics.	BL-V: Evaluation
CO3	Design the geosynthetics for the intended engineering purposes.	BL-III: Applying
CO4	Apply geocomposite systems to solve contemporary geotechnical problems.	BL-III: Applying
CO5	Design geomembranes for the intended engineering purposes.	BL-III: Applying

Unit	***Course Contents***	***No. of Lectures (Hrs.)***
Unit 1	**Introduction:** An overview on the development, functions and applications of various geosynthetics – the geotextiles, geogrids, geonets, geomembranes, geocomposites and other products	07
Unit 2	**Designing with Geotextiles:** Manufacture of geotextiles, Geotextile properties and test methods – functions - Designing geotextiles for separation, reinforcement, stabilization, filtration and drainage applications	09
Unit 3	**Designing with Geogrids:** Manufacture of geogrids, Types of geogrids, Geogrid properties and test methods, physical properties, mechanical properties, endurance properties and environmental properties, Designing geogrid for reinforcement in pavements, retaining walls and bearing capacity.	07
Unit 4	**Designing with Geonets:** Manufacture of geonets, Geonet properties and test methods – Physical properties, mechanical properties, hydraulic properties, endurance properties and environmental properties -Designing geonet for drainage purposes.	008
Unit 5	**Designing with Geomembranes:** Manufacture of geomembranes-Geomembrane properties and test methods – physical properties, mechanical properties, chemical properties and biological hazard - Applications of geomembranes and the relevant designs	08

Text Books:

1) Koerner, R.M., Designing with geosynthetics", Pearson Education Inc., 2012, 6th edition,

2) Mandal, J.N., "Geosynthetics Engineering: in Theory and Practice", Research Publishing, Singapore, 2018, 1st edition.

Reference Books:

1) Swami Saran, I.K., Reinforced Soil and its Engineering Applications" International Publishing

	House Pvt. Ltd., 2019, 1st edition
2)	Mazenn Alshaaer and Han-Yong Jeon "Geopolymers and other Geosynthetics", IntechOpen. 2020.
3)	"ICE Handbook of Geosynthetic Engineering: Geosynthetics and their Applications, ICE Publications, 2021
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	1	1	1	1	1	-	1	1
CO2	1	1	1	1	-	-	1	1	-	-	1	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1
CO4	1	-	1	-	1	1	1	2	1	1	2	1
CO5	1	1	1	2	-	2	-	1	-	1	2	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

First Year B. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Mini Project (25PCE12172)

Teaching Scheme:			**Evaluation Scheme:**	
	No. of Hrs./week	**No. of Credits**		
Lectures:	-	-	**MSE:**	-
Tutorials:	-	-	**ICA:**	50 Marks
Practical:	02	01	**ESE:**	-
Total:	02	01	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO 1	Apply engineering principles to real-world projects	BL-III: Applying
CO 2	Plan and monitor project tasks individually or as a team	BL-V: Evaluate
CO 3	Demonstrate practical experience in project execution	BL-II: Understand
CO 4	Communicate project findings clearly through reports and presentations	BL-III: Applying

Evaluation Criteria: The student will be evaluated by the panel based on the below criteria

Criteria	***Details***	***Weightage***
I	Identification of Problem Domain	Weightage for each criterion will be determined by the panel and will be informed to the students.
II	Study of Existing Systems and establishing clear objectives	
III	Planning of project and work distribution within the team	
IV	Proper Documentation and Technical Writing	
V	Presentation and Response to questions	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2	2	2	1	2	1	1	1	3	1
CO2	-	1	1	1	1	-	2	-	3	1	1	1
CO3	1	-	1	1	1	-	1	1	-	-	1	1
CO4	1	-	1	-	1	1	1	2	1	1	2	1
CO5	1	1	1	2	-	2	-	1	-	1	2	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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First Year M. Tech.

Semester-II (w.e.f. A.Y. 2025-26)

Research Publication and Ethics (25PCE12673)

Teaching Scheme:			**Evaluation Scheme:**	
	No. of Hrs./week	**No. of Credits**		
Lectures:	-	-	**MSE:**	-
Tutorials:	-	-	**ICA:**	50 Marks
Practical:	4	2	**ESE:**	-
Total:	4	2	**OE/POE :**	-

Course Outcomes: At the end of this course, students shall be able to		***BL Level***
CO 1	Conduct systematic literature reviews and identify problem	BL-IV: Analyze
CO 2	Develop skills in academic writing and manuscript preparation	BL-III: Applying
CO 3	Apply ethical principles in research conduct and publication	BL-III: Applying
CO 4	Use reference management tools and citation standards effectively	BL-III: Applying
CO 5	Prepare and present research findings in various formats	BL-IV: Analyze

Course Description- This course introduces MTech students to the principles, practices, and ethics of research publication in engineering and technology. Students will learn the complete research publication lifecycle, from literature review to manuscript submission, while developing a strong foundation in research ethics and integrity

Ex.	***Experiment Details***	***No. of Ex. Sessions (hrs.)***
Ex. 1	Database exploration: IEEE Xplore, Science Direct, Springer Link, dataset sites like Kaggle	4
Ex. 2	Identify scope and Journal selection criteria and evaluation	2
Ex. 3	Calculation of Various Indices related to Impact Factor	2
Ex. 4	Systematic Literature review and literature matrix preparation	12
Ex. 5	Research Proposal Development- Synopsis writeup	8
Ex. 6	Manuscript Writeup exercise	8
Ex. 7	Use of Plagiarism detection tools	4
Ex. 8	Final manuscript submission and checklist	4
Ex. 9	Mock peer review exercise and Response to reviewer comments workshop	4
Ex. 10	Authorship agreement drafting and Copyright compliance	4

Text Books:

1) "The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, Joseph Bizup, William T. FitzGerald , University of Chicago press.
2) **Research Ethics: A Philosophical Guide to the Responsible Conduct of Research by L. Vaughn, Oxford University Press, 2019**

Reference Books:

1) **"The Elements of Style", by William Strunk Jr., E.B. White, Pearson, 2019**

Online Resources:

	1. Committee on Publication Ethics (COPE) - https://publicationethics.org
	2. Office of Research Integrity (ORI)- https://ori.hhs.gov/
	3. IEEE Author Center -https://ieeeauthorcenter.ieee.org/
	4. Springer Nature Author Services -https://authorservices.springernature.com/
	5. Elsevier Author Hub -https://www.elsevier.com/authors
Software and Tools	
	Reference Management: Mendeley, Zotero, EndNote
	Plagiarism Detection: Turnitin, Grammarly, Copyscape
	Writing Tools: LaTeX, Microsoft Word, Google Docs
	Statistical Analysis: R, Python, MATLAB
	Data Visualization: Tableau, matplotlib, ggplot2
	AI Tools
Internal Continuous Evaluation (ICA):	
Evaluation is based on Assignments (4 Assignments +1Case study) and one synopsis. Attendance is also considered for ICA.	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	-	2	-	-	2	-	2	-	2
CO2	-	2	-	-	2	-	-	2	-	2	-	2
CO3	-	1	-	-	2	-	-	3	-	2	-	2
CO4	-	3	-	-	3	-	-	2	2	3	-	2
CO5	-	3	-	-	2	-	-	2	2	3	-	2

The strength of mapping is to be written as 1: low, 2: Medium, 3: High.

Semester III

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

Second Year M. Tech.

Semester-I (w.e.f. A.Y. 2025-26)

Soil Structure Interaction (26PCE21179)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	-	-	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	3	3	OE/POE :	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Identify the suitable method for the analysis of pile foundations.	BL-II: Understand
CO2	Perform the soil-pile interaction analysis for varying pile configurations	BL-III: Applying
CO3	Apply elastic analysis principles for design of pile foundations	BL-III: Applying
CO4	Analyze laterally loaded pile considering the effect of soil-pile interaction	BL-IV: Analyze
CO5		

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction:** An overview on the development, functions and applications of various geosynthetics – the geotextiles, geogrids, geonets, geomembranes, geocomposites and other products	07
Unit 2	**Beam on Elastic Foundation:** Manufacture of geotextiles, Geotextile properties and test methods – functions - Designing geotextiles for separation, reinforcement, stabilization, filtration and drainage applications	08
Unit 3	**Plate on Elastic Medium:** Manufacture of geogrids, Types of geogrids, Geogrid properties and test methods, physical properties, mechanical properties, endurance properties and environmental properties, Designing geogrid for reinforcement in pavements, retaining walls and bearing capacity.	07
Unit 4	**Elastic Analysis of Pile:** Manufacture of geonets, Geonet properties and test methods – Physical properties, mechanical properties, hydraulic properties, endurance properties and environmental properties -Designing geonet for drainage purposes.	07
Unit 5	**Laterally Loaded Pile:** Manufacture of geomembranes-Geomembrane properties and test methods – physical properties, mechanical properties, chemical properties and biological hazard - Applications of geomembranes and the relevant designs	07

Text Books:

1) Richard L Handy, Foundation Engineering Geotechnical Principles & Practical applications, Mc Graw Hill, New York, 2020.

2) Desai C.S. and Christain J.T., Numerical Methods in Geotechnical Engineering, McGraw Hill Book Co., New York, 2014.

Reference Books:

1) Woodward, J. and Tomlinson, M., Pile Design and Construction Practice, Chapman & Hall, 1994.

2)	Poulos, H.G. and Davis, E.H., Pile Foundation Analysis and Design, John Wiley & Sons, 1980.
3)	Bowels J.E, Analytical and Computer Methods in Foundation, McGraw Hill Book Co., New York, 1974.
4)	Structure Soil Interaction - State of Art Report, Institution of structural Engineers, 1978
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2	3	1	2	1	1	1	1	1
CO2	1	-	-	-	2	1	1	2	1	1	1	1
CO3	1	1	1	1	2	1	1	1	1	1	1	1
CO4	1	2	1	1	2	-	1	1	1	1	1	1
CO5	1	1	2	3	1	1	-	1	1	-	1	1

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

	FABTECH EDUCATION SOCIETY'S **FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH** **(An Autonomous Institute)**
	Second Year M. Tech.
	Semester-III (w.e.f. A.Y. 2025-26)
	MOOC's/NPTEL, Self Learning Courses/MKCL (26PCE21674)
This is as per NPTEL Course registered	

	FABTECH EDUCATION SOCIETY'S **FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH** **(An Autonomous Institute)**
	Second Year M. Tech.
	Semester-III (w.e.f. A.Y. 2025-26)
	Open Elective Course (26PCE21571 / 26PCE21572 / 26PCE21573)
This will be floated at institutive level well before the start of the semester.	

FABTECH EDUCATION SOCIETY'S
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Second Year M. Tech.

Semester-III (w.e.f. A.Y. 2025-26)

Business Analytics (26PCE21571)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Introduce analytical thinking and data-driven decision-making in business environments.	Understand – BL2
CO2	Develop skills in statistical analysis and predictive modeling.	Apply – BL3
CO3	Familiarize students with data visualization and business intelligence tools.	Apply – BL3
CO4	Apply machine learning and optimization techniques to solve business problems.	Analyze – BL4
CO5	Evaluate analytics-driven strategies for improving organizational performance	Evaluate – BL5

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction to Business Analytics:** Evolution of Business Analytics , Types of Analytics: Descriptive, Diagnostic, Predictive and Prescriptive Analytics, Analytics Process and Framework, Role of Data in Business Decision Making, Business Intelligence vs Business Analytics, Applications in Marketing, Finance, HR, Supply Chain and Operations, Data-driven Organizations and Digital Transformation, Case Studies on Business Analytics Applications	8
Unit 2	**Data Management and Statistical Analysis:** Data Sources and Data Collection Methods, Structured, Semi-Structured and Unstructured Data, Data Cleaning, Data Integration and Data Preparation, Descriptive Statistics, Probability Distributions, Sampling Techniques, Correlation and Regression Analysis, Hypothesis Testing, Exploratory Data Analysis (EDA)	8
Unit 3	**Predictive Analytics and Machine Learning:** Fundamentals of Predictive Analytics, Forecasting Techniques, Linear and Multiple Regression Models, Classification and Prediction, Decision Trees, Naïve Bayes Classifier, Clustering Techniques (K-Means, Hierarchical Clustering), Association Rule Mining, Introduction to Machine Learning in Business	8
Unit 4	**Data Visualization and Business Intelligence:** Principles of Effective Data Visualization, Dashboards and Scorecards, Data Visualization Techniques, Business Intelligence Systems, KPI Development and Performance Monitoring, Visualization Tools: Tableau, Power BI, Google Data Studio, Interactive Reporting and Storytelling with Data. Business Analytics Case Studies	8
Unit 5	**Prescriptive Analytics and Emerging Trends:** Optimization Models in Business, Linear Programming Applications, Decision Analysis under Uncertainty, Simulation Techniques, Risk Analytics, Customer Analytics and Recommendation Systems, Big Data Analytics, Artificial Intelligence and Generative AI in Business, Ethical Issues, Privacy and Data Governance, Future Trends in Business Analytics	8

Text Books:

1)	S. Christian Albright, Wayne L. Winston: Business Analytics: Data Analysis and Decision Making, Cengage Learning, 7th Edition
2)	James R. Evans: Business Analytics, Pearson Education, 4th Edition.
3)	Ramesh Sharda, Dursun Delen, Efraim Turban: Business Intelligence, Analytics, and Data Science, and AI, Pearson, 5th Edition.
Reference Books:	
1)	Foster Provost, Tom Fawcett: Data Science for Business, O'Reilly Media. 2013
2)	Thomas H. Davenport, Jeanne G. Harris: Competing on Analytics, Harvard Business Review Press. 2013
3)	Ajit C Tamhane: Predictive Analytics: Parametric Models for Regression and Classification Using R, Wiley Publications, 2021.
4)	Jiawei Han, Micheline Kamber, Jian Pei: Data Mining: Concepts and Techniques, Morgan Kaufmann. Elsevier, 2012
5)	Cole Nussbaumer Knaflic: Storytelling with Data: A Data Visualization Guide for Business Professionals, Wiley.
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	–	–	1	–	–	–	–	–	–	1
CO2	3	3	2	2	2	–	–	–	–	–	–	1
CO3	3	3	3	3	3	–	–	–	–	–	–	2
CO4	2	3	2	3	3	–	–	–	1	2	–	1
CO5	2	3	3	3	2	1	1	1	1	1	2	2

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
(An Autonomous Institute)

Second Year M. Tech.

Semester-III (w.e.f. A.Y. 2025-26)

Non-Conventional Energy (26PCE21572)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE :	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Explain the principles, characteristics, and potential of various non-conventional energy resources.	Understand – BL2
CO2	Apply engineering concepts to assess solar, wind, biomass, geothermal, and ocean energy systems.	Apply – BL3
CO3	Analyze the performance and operational aspects of renewable energy conversion technologies.	Analyze – BL4
CO4	Evaluate the technical, economic, environmental, and sustainability aspects of non-conventional energy systems.	Evaluate – BL5
CO5	Design suitable renewable energy solutions for specific applications considering societal and environmental needs.	Create – BL6

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction to Non-Conventional Energy Sources:** Energy Scenario and Environmental Issues, Conventional vs Non-Conventional Energy Sources, Renewable Energy Potential in India, Energy Policies and Sustainable Development	8
Unit 2	**Solar Energy Systems:** Solar Radiation and Measurement, Solar Thermal Systems, Solar Photovoltaic Systems, Energy Storage and Applications	8
Unit 3	**Wind, Biomass and Biogas Energy:** Wind Energy Conversion Systems, Wind Turbine Components and Performance, Biomass Resources and Conversion Technologies, Biogas Plants and Applications	8
Unit 4	**Geothermal, Ocean and Small Hydro Energy:** Geothermal Energy Resources and Utilization, Tidal, Wave and Ocean Thermal Energy Conversion, Small Hydro Power PlantsHybrid Renewable Energy Systems	8
Unit 5	**Energy Economics and Sustainability:** Economic Analysis of Renewable Energy Projects, Environmental Impact Assessment, Grid Integration Issues, Smart Grids and Future Energy Systems, Case Studies	8

Text Books:

1) G.D. Rai: Non-Conventional Energy Sources, Khanna Publishers, 6th Edition
2) John Twidell: Renewable Energy Resources, Routledge, 4th Edition
3) V.V. Kishore: Renewable Energy Engineering and Technology and Practice, TERI Press.

Reference Books:

1) Suhas Pandurang Sukhatme: Solar Energy: Principles of Thermal Collection and Storage. McGraw-Hill Education (India)
2) J. F. Manwell , J. G. McGowan, A. L. Rogers: Wind Energy Explained, John Wiley
3) Gilbert M. Masters, Kevin F. Hsu : Renewable and Efficient Electric Power Systems, 3rd Edition, Wiley-

	IEEE
4)	D. Mukarjee and S. Chakraborti: Fundamentals of Renewable Energy Systems, New Age International (Pvt) Ltd.
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	–	–	1	–	2	–	–	–	–	1
CO2	3	3	2	2	2	–	2	–	–	–	–	1
CO3	3	3	2	3	2	–	2	–	–	–	–	1
CO4	2	3	2	3	1	2	3	2	–	–	1	1
CO5	2	2	3	2	2	2	3	1	1	1	2	2

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

FABTECH EDUCATION SOCIETY'S
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(An Autonomous Institute)

Second Year M. Tech.

Semester-III (w.e.f. A.Y. 2025-26)

Organizational Behaviour (26PCE21573)

Teaching Scheme:			Evaluation Scheme:	
	No. of Hrs./week	No. of Credits		
Lectures:	3	3	MSE:	30 Marks
Tutorials:	1	1	ICA:	10 Marks
Practical:	-	-	ESE:	60 Marks
Total:	4	4	OE/POE:	-

Course Outcomes: At the end of this course, students shall be able to		*BL Level*
CO1	Explain the fundamental concepts, theories, and models of organizational behaviour and their relevance in modern organizations.	Understand – BL2
CO2	Analyze individual behaviour, personality, perception, motivation, and learning processes affecting organizational effectiveness.	Analyze – BL4
CO3	Evaluate group dynamics, leadership styles, communication processes, and team effectiveness in organizational settings.	Evaluate – BL5
CO4	Apply organizational behaviour concepts to manage conflict, stress, organizational culture, and change management issues.	*Apply – BL3*
CO5	Develop strategies for improving organizational effectiveness, employee engagement, and leadership in diverse work environments.	Create – BL6

Unit	*Course Contents*	*No. of Lectures (Hrs.)*
Unit 1	**Introduction to Organizational Behaviour:** Nature and Scope of Organizational Behaviour, Foundations of Individual Behaviour, Models of Organizational Behaviour, Challenges and Opportunities in Organizational Behaviour, Emerging Trends in Organizations, Organizational Effectiveness	8
Unit 2	**Individual Behaviour in Organizations:** Personality and Determinants of Personality, Perception and Attribution Theory, Learning Theories, Attitudes and Job Satisfaction, Emotional Intelligence, Motivation Theories: Maslow, Herzberg, McGregor, McClelland, Vroom	8
Unit 3	**Group Behaviour and Leadership:** Group Dynamics and Group Development, Team Building and Team Effectiveness, Communication Process and Barriers, Leadership Theories and Styles, Power and Politics, Decision Making in Organizations	8
Unit 4	**Organizational Processes**: Conflict Management and Negotiation, Stress Management, Organizational Culture, Organizational Climate, Employee Engagement, Organizational Citizenship Behaviour	8
Unit 5	**Organizational Change and Development:** Organizational Change and Resistance to Change, Change Management Models, Organizational Development Interventions, Diversity and Inclusion, Work-Life Balance, Contemporary Issues in Organizational Behaviour, Case Studies	8

Text Books:

1)	Stephen P. Robbins, Timothy A. Judge : Organizational Behavior, Pearson Education, 20th Edition
2)	**Steven McShane, Mary Ann Von Glinow, Himanshu Rai:** Organizational Behaviour, McGraw-Hill Education, 9th Edition
3)	P. Subbarao: Organizational Behaviour: Text, Cases and Games, Himalaya Publishing House, 3rd Edition

Reference Books:	
1)	John W. Newstrom : Organizational Behavior: Human Behavior at Work, 14th Edition
2)	Henry Tosi, Gainesville and Massimo Pilati, Professor of Organization: Managing Organizational Behavior, EE, 2011
3)	Thomas G. Cummings | Christopher G. Worley : Organization Development and Change with MindTap, 11th Edition, Cengage, 2019
4)	James M. Kouzes and Barry Z. Posne: *The Leadership Challenge: How to Make Extraordinary Things Happen in Organizations*, Wiley, 2023
In Semester Examination (MSE):	
MSE shall be based upon student's performance in three tests conducted and evaluated at institute level	

Mapping of Cos and POs:

PO → / CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	–	–	–	1	–	1	–	1	–	1
CO2	2	3	1	1	–	1	–	1	1	1	–	1
CO3	1	3	2	1	–	2	–	1	3	3	1	1
CO4	1	2	2	1	–	3	1	2	2	2	1	1
CO5	1	2	3	1	–	2	1	2	3	2	3	2

Note: The strength of mapping is to be written as 1: low, 2: Medium, 3: High

Semester IV

FABTECH EDUCATION SOCIETY'S
FABTECH TECHNICAL CAMPUS COLLEGE OF ENGINEERING & RESEARCH
(An Autonomous Institute)

Curriculum for Second Year M. Tech. with effect from A.Y. 2025-26

Semester IV

Course Type	*Course Code*	*Name of the Course*	*Engagement Hours*			*Credits*	**In Semester Evaluation Scheme**		**End Semester Evaluation Scheme**		*Total Marks*
			L	*T*	*P*		**MSE**	**ICA**	**ESE**	**OE/ POE**	
							M	**M**	**M**	**M**	
DIS/ INT	26PCE22676	Dissertation Part-B	-	-	04	20	-	200	-	200	400
		Total	**-**	**-**	**04**	**20**	**-**	**200**	**-**	**200**	**400**
			Abbreviations: L= Lecture, **T** = Tutorial, **P** = Practical, **M** = Marks