



B.TECH.-CIVIL ENGINEERING II-YEAR COURSE STRUCTURE

B.Tech.–II Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	23A100011	Numerical and Statistical Methods	3	0	0	3
2	23A100032	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	23A101201T	Surveying	3	0	0	3
4	23A101202T	Strength of Materials	3	0	0	3
5	23A101203	Fluid Mechanics	3	0	0	3
6	23A101201P	Surveying Lab	0	0	3	1.5
7	23A101202P	Strength of Materials Lab	0	0	3	1.5
8	23A101204	Building Planning and Drawing	0	1	2	2
9	23A100033	Environmental Science	2	0	0	-
Total			16	02	08	20

B.Tech.-II Year II Semester

S. No.	Category	Title	L	T	P	Credits
1	23A100701a 23A100701b 23A100701c	Managerial Economics and Financial Analysis Organizational Behavior Business Environment	2	0	0	2
2	23A101205T	Engineering Geology	3	0	0	3
3	23A101206T	Concrete Technology	3	0	0	3
4	23A101207	Structural Analysis	3	0	0	3
5	23A101208	Hydraulics & Hydraulic Machinery	3	0	0	3
6	23A101206P	Concrete Technology Lab	0	0	3	1.5
7	23A101205P	Engineering Geology lab	0	0	3	1.5
8	23A100034	Soft Skills	0	1	2	2
9	23A103209	Design Thinking & Innovation	1	0	2	2
Total			15	1	10	21
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation						



B.TECH.-CIVIL ENGINEERING III YEAR COURSE STRUCTURE

III B.Tech. I Semester

S. No.	Course code	Title	L	T	P	Credits
1.	23A101301	Water Resources Engineering	3	0	0	3
2.	23A101302	Design Of Reinforced Concrete Structures	3	0	0	3
3.	23A101303T	Geotechnical Engineering	3	0	0	3
4.	23A101304a 23A101304b 23A101304c	Professional Elective-I 1. Pre-stressed Concrete 2. Air Pollution and Control 3. Environmental Impact Assessment	3	0	0	3
5.		Open Elective-I	3	0	0	3
6.	23A101303P	Geotechnical Engineering Lab	0	0	3	1.5
7.	23A101306	Fluid Mechanics Hydraulic Machines Lab	0	0	3	1.5
8.	23A101307	Skill oriented course Estimation, Specifications, Costing & Valuation	0	1	2	2
9.	23A104306P	Tinkering Lab	0	0	2	1
10.	23A101315	Evaluation of Community Service Internship	-	-	-	2
11.	23A104320	Introduction To Quantum Technologies and Applications (Qualitative Treatment)	3	0	0	3
Total			15	1	10	26

Open Elective – I

S. No.	Course Code	Course Name	Offered by the Dept.
1	23A102305	Electrical Safety Practices and Standards	EEE
2	23A103505	Sustainable Energy Technologies	ME
3	23A104313	Electronic Circuits	ECE
4	23A105304	Java Programming	CSE& Allied/IT
5	23A133312	Introduction to Artificial Intelligence	
6	23A100035	Mathematics for Machine Learning and AI	Mathematics
7	23A100036	Materials Characterization Techniques	Physics
8	23A100037	Chemistry of Energy Systems	Chemistry
9	23A100038	English for Competitive Examinations	Humanities
10	23A100039	Entrepreneurship and New Venture Creation	

Note:

1. A student is permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Minor from V Semester onwards.
2. A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.
3. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline



III B.Tech. II Semester

S.No.	Course code	Title	L	T	P	Credits
1.	23A101308	Design of Steel Structures	3	0	0	3
2.	23A101309T	Highway Engineering	3	0	0	3
3.	23A101310T	Environmental Engineering	3	0	0	3
4.	23A101311a 23A101311b 23A101311c	Professional Elective-II 1. Design of Earthquake Resistant Structures 2. Open Channel Flow 3. Foundation Engineering	3	0	0	3
5.	23A101312a 23A101312b 23A101312c	Professional Elective-III 1. Cost effective Housing Techniques 2. Watershed Management 3. Advanced Structural Analysis	3	0	0	3
6.		Open Elective-II	3	0	0	3
7.	23A101309P	Highway Engineering Lab	0	0	3	1.5
8.	23A101310P	Environmental Engineering Lab	0	0	3	1.5
9.	23A101314	Skill oriented course Building Information Modelling	0	1	2	2
10.	23A100043	Mandatory noncredit course Technical paper writing & IPR	2	0	0	-
11.	23A101315	Workshop	0	0	0	0
Total			20	1	8	23

Mandatory Industry Internship of 08 weeks duration during summer vacation

Open Elective – II

S. No.	Course Code	Course Name	Offered by the Dept.
1	23A102312	Renewable Energy Sources	EEE
2	23A103311	Automation and Robotics	ME
3	23A104315	Digital Electronics	ECE
4	23A132302T	Operating Systems	CSE& Allied/IT
5	23A133313	Machine Learning	
6	23A100044	Optimization Techniques	Mathematics
7	23A100040	Physics Of Electronic Materials and Devices	Physics
8	23A100041	Chemistry Of Polymers and Applications	Chemistry
9	23A100042	Academic Writing and Public Speaking	Humanities



B.TECH.-CIVIL ENGINEERING IV-YEAR COURSE STRUCTURE

IV B.Tech I Semester

S. No.	Course code	Title	L	T	P	Credits
1	23A101401	Finite Element Methods	3	0	0	3
2	23A100702a 23A100702b 23A100702c	Management Course-II 1.Business Ethics and Corporate Governance 2.E-Business 3.Management Science	2	0	0	2
3	23A101402a 23A101402b 23A101402c	Professional Elective-IV 1.Geo-synthetics and Reinforced Earth Structures 2.Railways, Airports, Docks and Harbour Engineering 3. Experimental Stress Analysis	3	0	0	3
4	23A101403a 23A101403b 23A101403c	Professional Elective-V 1. Ground Improvement Techniques 2. Subsurface Investigation and Instrumentation 3. Transportation Economics	3	0	0	3
5		Open Elective-III	3	0	0	3
6		Open Elective-IV	3	0	0	3
7	23A101406	Skill oriented course Skills in Civil Engineering software (STAADPRO/CAD/TEKL)	0	1	2	2
8	23A100059	Audit Course Gender Sensitization	2	0	0	-
9	23A101407	Evaluation of Industry Internship	-	-	-	2
Total			19	1	2	21

Open Elective – III

S.No	Course Code	Course Name	Offered by the Dept.
1	23A102407	Smart Grid Technologies	EEE
2	23A103704	3D Printing Technologies	ME
3	23A104404	Microprocessors and Microcontrollers	ECE
4	23A105207	Data Base Management Systems	CSE & Allied/IT
5	23A105309b	Cyber Security	
6	23A100050	Wavelet transforms and its applications	Mathematics
7	23A100051	Smart Materials and Devices	Physics
8	23A100052	Green Chemistry and Catalysis for Sustainable Environment	Chemistry
9	23A100053	Employability Skills	Humanities

**Open Elective – IV**

S. No	Course Code	Course Name	Offered by the Dept.
1	23A102408	Electric Vehicles	EEE
2	23A103703c	Total Quality Management	ME
3	23A104405	Transducers and Sensors	ECE
4	23A105302	Computer Networks	CSE & Allied/IT
5	23A105401d	Internet of Things	
6	23A100054	Financial Mathematics	Mathematics
7	23A100055	Sensors And Actuators for Engineering Applications	Physics
8	23A100056	Chemistry Of Nanomaterials and Applications	Chemistry
9	23A100057	Literary Vibes	Humanities

IV B.Tech. II Semester

S.No.	Course code	Title	Category	L	T	P	Credits
1	23A101408	Internship		-	-		4
		Project					8
Total							12



B.TECH.-CIVIL ENGINEERING II YEAR COURSE STRUCTURE & SYLLABI

B.Tech.–II Year I Semester

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5	23A101203	Fluid Mechanics	3	0	0	3
6	23A101201P	Surveying Lab	0	0	3	1.5
7	23A101202P	Strength of Materials Lab	0	0	3	1.5
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4	23A101207	Structural Analysis	3	0	0	3
5	23A101208	Hydraulics & Hydraulic Machinery	3	0	0	3
6	23A101206P	Concrete Technology Lab	0	0	3	1.5
7	23A101205P	Engineering Geology lab	0	0	3	1.5
8	23A100034	Soft Skills	0	1	2	2
9	23A103209	Design Thinking & Innovation	1	0	2	2
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II Year B.Tech. CE-I Semester

L	T	P	C
3	0	0	3

(23A100011) NUMERICAL & STATISTICAL METHODS**Course Outcomes:**

After successful completion of this course, the students should be able to:

CO's	Statements	Blooms level
CO1	Apply numerical methods to solve algebraic and transcendental equations	L2,L3
CO2	Derive interpolating polynomials using interpolation formulae	L3,L5
CO3	Solve differential and integral equations numerically	L3
CO4	To identify real life problems in to Mathematical Models.	L2,L3
CO5	To apply the probability theory and testing of hypothesis in the field of civil Engineering Applications.	L3,L5

Pre-requisite: Basic algebraic Equations, Probability, random variables (discrete and continuous) and probability distributions.

UNIT I Solution of Algebraic & Transcendental Equations

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

UNIT II Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III Solution of Initial value problems to Ordinary differential equations

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V Small sample tests

Student t-distribution(test for single mean, two means and paired t-test),testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B.S.Grewal, Higher Engineering Mathematics,KhannaPublishers,2017,44th Edition
3. Millerand Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008. India.



Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R.K. Jain and S. R.K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE
4. H. K. Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. <http://nptel.ac.in/courses/111105090>



II Year B.Tech. CE-I Semester

L	T	P	C
2	1	0	3

**(23A100032) UNIVERSAL HUMAN VALUES–UNDERSTANDING HARMONY AND
ETHICAL HUMAN CONDUCT
(Common to All Branches of Engineering)**

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:		Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	L1,L2
CO2	Identify one's self, and one's surroundings(family, society nature)	L1,L2
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	L3
CO4	Relate human values with human relationship and human society.	L4
CO5	Justify the need for universal human values and harmonious existence	L5
CO6	Develop as socially and ecologically responsible engineers	L3,L6

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

- UNIT I** Introduction to Value Education (6 lectures and 3 tutorials for practice session)
- Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
- Lecture 2: Understanding Value Education
- Tutorial 1: Practice Session PS1 Sharing about Oneself
- Lecture 3: self-exploration as the Process for Value Education
- Lecture 4: Continuous Happiness and Prosperity–the Basic Human Aspirations
- Tutorial 2: Practice Session PS2 Exploring Human Consciousness
- Lecture 5: Happiness and Prosperity – Current Scenario



Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial3: Practice Session PS3 Exploring Natural Acceptance

- UNIT II** Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture8: Distinguishing between the Needs of these If and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture12: Programme to ensure self-regulation and Health
Tutorial6: Practice Session PS6 Exploring Harmony of self with the body
- UNIT III** Harmony in the Family and Society(6lectures and 3tutorials for practice session)
Lecture13: Harmony in the Family–the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial7: Practice Session PS7 Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect
Lecture16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture18: Vision for the Universal Human Order
Tutorial9: Practice Session PS9 Exploring Systems to fulfil Human Goal
- UNIT IV** Harmony in the Nature/Existence (4lectures and 2tutorials for practice session)
Lecture19: Understanding Harmony in the Nature
Lecture20: Inter connectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture22: The Holistic Perception of Harmony in Existence
Tutorial11: Practice Session PS11 Exploring Co-existence in Existence
- UNIT V** Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)
Lecture 23: Natural Acceptance of Human Values
Lecture24: Definitiveness of (Ethical)Human Conduct
Tutorial12: Practice Session PS12 Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture26: Competence in Professional Ethics
Tutorial13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture28: Strategies for Transition towards Value-based Life and Profession



Tutorial14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I– Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II–Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III–Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV–Harmony in the Nature(Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNITV–Implications of the Holistic Understanding–a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

RR Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, *Teachers' Manual for A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. *Jeevan Vidya :Ek Parichaya*, ANagaraj ,Jeevan Vidya Prakashan, Amarkantak,1999.
2. *Human Values*, A.N.Tripathi, New AgeIntl. Publishers, NewDelhi,2004.
3. *The Story of Stuff*(Book).
4. *The Story of My Experiments with Truth*-by Mohandas Karamchand Gandhi
5. *Small is Beautiful*-E.F Schumacher.
6. *Slow is Beautiful*-Cecile Andrews
7. *Economy of Permanence*-J C Kumarappa
8. *Bharat Mein Angreji Raj*–Pandit Sunderlal
9. *Redis covering India*-by Dharampal
10. *Hind Swarajor Indian Home Rule*-by Mohandas K.Gandhi
11. *India Wins Freedom*-Maulana Abdul KalamAzad



12. Vivekananda-Romain Rolland(English)

13. Gandhi-Romain Rolland(English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions(tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>



6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview



II Year B.Tech. CE-I Semester

L	T	P	C
3	0	0	3

(23A101201T) SURVEYING**Course Objectives:**

The objective of this course are to:

- Know the principle and methods of surveying and measuring of horizontal and vertical- distances and angles
- Identification of source of errors and rectification methods
- Know surveying principles to determine areas and volumes
- Setting out curves and use modern surveying equipments for accurate results
- Know the basics of Photogrammetric Surveying

Course Outcomes:

CO	Statement	Blooms level
CO1	Apply the principle and methods of surveying and measuring of horizontal and vertical- distances and angles	L2
CO2	Identify the source of errors and rectification methods	L3
CO3	Apply surveying principles to determine are as and volumes	L2
CO4	Setting out curves and using modern surveying equipments	L3
CO5	Apply the basics of Photogrammetry Surveying infield	L4

Syllabus:**UNIT-I**

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying.

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip –systems and W.C.B and Q.B systems of locating bearings.

UNIT-II

Leveling-Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring-Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes-Determination of volume of earthwork in cutting and embankments for level section, capacity of reservoirs.

UNIT-III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.



UNIT-IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves. Introduction to Tacheometric Surveying.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDAR Survey (Light Detection And Ranging).

UNIT-V

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes.

Text Books:

1. Surveying (Vol- 1 & 2) by Duggal SK, Tata Mc Graw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.
2. Textbook of Surveying by C Venkatramaiah, Universities Press 1st Edition, 2011.

Reference Books:

1. Surveying (Vol-1), by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications (P) Ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol-2), by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications (P) Ltd., New Delhi 17th 2022.
3. Surveying (Vol-3), by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain- Laxmi Publications (P) Ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying by Chandra AM, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
5. Surveying and Levelling by N. Basak Tata Mc Graw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

Web Resources:

https://koha.srmap.edu.in/cgi-bin/koha/opac-detail.pl?biblionumber=11522&shelfbrowse_itemnumber=23066



II Year B.Tech. CE-I Semester

L	T	P	C
3	0	0	3

(23A101202T) STRENGTH OF MATERIALS**Course Objectives:**

- To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress
- To impart concepts of shear force and bending moment on various types of beams and loading conditions
- To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
- The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
- To classify cylinders and columns based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure

Course Outcomes:

CO	Statement	Blooms level
CO1	To understand the basic materials behavior under the influence of different External loading conditions and the support conditions.	L2
CO2	To draw the diagrams indicating the variation of the key performance features Like axial forces, bending moment and shear forces in structural members.	L3
CO3	To acquire knowledge of bending concepts and calculation of section modulus And for determination of stresses developed in the beams	L2
CO4	To analyze the deflections due to various loading conditions.	L3
CO5	To assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to with stand the internal pressure using Lamé's equation	L4

UNIT I:

Simple Stresses and Strains: Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

UNIT II:

Shear Force and Bending Moment: Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT III:**Flexural and Shear Stresses:**

Flexural Stresses: Theory of simple bending—Assumptions—Derivation of bending



equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams

Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

Torsion—circular shafts only.

UNIT IV:

Deflection of Beams: Double integration and Macaulay's methods—Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems — Moment area method — application to simple cases of cantilever.

UNITV:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory– Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula –Perry's formula.

Thin and Thick cylindrical shells — Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains — changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders-distribution of stresses

Textbooks:

1. Strength of Materials by R.K.Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S.Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
3. Strength of Materials by J.K.Gupta and S.K.Gupta, Cengage publications 2nd edition, 2024

References:

1. Advanced Mechanics of Solids, L.Srinath, McGraw Hill Education, 2017, 3rd Edition
2. Strength of Materials-Fundamentals and Applications, T.D.Gunneswara Rao and Mudim by Andal, Cambridge University Press, 2018, 1st Edition
3. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
4. Mechanics of Solids—EPPopov, PrenticeHall, 2nd Edition, 2015.
5. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
6. Strength of Materials by S.S.Ratan Tata Mc Grill Publications 3rd Edition, 2016.



II Year B.Tech. CE-I Semester

L	T	P	C
3	0	0	3

(23A101203)FLUID MECHANICS**Course Objectives:**

- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To impart ability to solve engineering problems in fluid mechanics
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
- To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes:

COs	STATEMENTS	Blooms level
CO1	Understand the principles of fluids statics, kinematics and dynamics	L2
CO2	Apply the laws of fluid statics and concepts of buoyancy	L3
CO3	Understand the fundamentals of fluid kinematics and differentiate types of fluid flows	L2
CO4	Apply the Principle of conservation of energy for flow measurement.	L3
CO5	Analyse the losses in pipes and discharge through pipe network.	L4

UNIT-I

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

UNIT-II

Fluid statics: Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

UNIT-III**Fluid kinematics:**

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three-Dimensional continuity equations in Cartesian coordinates.

**UNIT-IV**

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT-V

Analysis of Pipe Flow: Energy losses in pipelines; Darcy– Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

Reference Books:

1. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
4. C.S.P. Ojha, R. Berndtsson and P.N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Online Learning Resources:

<https://archive.nptel.ac.in/courses/112/105/112105269>
<https://nptel.ac.in/courses/112104118>
<https://nptel.ac.in/courses/105103192>



II Year B.Tech. CE–I Semester

L	T	P	C
0	0	3	1.5

(23A101201P) SURVEYING LAB**Course Objectives:**

- Know about various linear and angular measuring instruments
- Take Measurements in the linear and angular view
- Determine the area and volume by interpreting the data obtained from surveying activities
- Know modern equipment such as total station
- Draft field notes from survey data

Course Outcomes: Upon the successful completion of this course, the students will able to:

- Handle various linear and angular measuring instruments
- Measure the linear and angular measurements
- Calculate the area and volume by interpreting the data obtained from surveying activities
- Handle modern equipment such as total station
- Prepare field notes from survey data

List of Field Works:

1. Chain survey of road profile with offsets incase of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey; finding the area of a given boundary by the method of Radiation
4. Fly levelling: Height of the instrument method(differential leveling) & rise and fall method
5. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
6. Theodolite survey: finding the distance between two inaccessible points.
7. Theodolite survey: finding the height of far object.
8. Determination of area perimeter using total station.
9. Determination of distance between two inaccessible point by using total station.
10. Setting out a curve
11. Determining the levels of contours
12. Demonstration on Drone survey

Note: Any Ten experiments may be completed.

**II Year B.Tech. CE–I Semester**

L	T	P	C
0	0	3	1.5

(23A101202P) STRENGTH OF MATERIALS LAB**Course objectives:**

- To determine the tensile strength and yield parameters of mild steel
- To find out flexural strengths of Steel/Wood specimens and measure deflections
- To determine the torsion parameters of mild steel bar
- To determine the hardness numbers, impact and shear strengths of metals
- To determine the load-deflection parameters for springs

Course Outcomes:

- Conduct tensile strength test and draw stress-strain diagrams for ductile metals
- Perform bending test and determine load-deflection curve of steel/wood
- Able to conduct torsion test and determine torsion parameters
- Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
- Able to conduct tests on closely coiled and open coiled springs and calculate deflections

LIST OF EXPERIMENTS:

1. Tension test on mild steel.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test on mild steel .
5. Hardness test on steel .
6. Compression test on Open coiled springs.
7. Tension test on Closely coiled springs.
8. Compression test on wood/concrete.
9. Izod/Charpy Impact test on metals.
10. Shear test on metals.
11. Strain measurement by use of electrical resistance strain gauges.
12. Continuous beam–deflection test.

Note: Any Ten experiments may be completed.



II Year B.Tech. CE-I Semester

L	T	P	C
0	1	2	2

(23A101204)BUILDING PLANNING AND DRAWING**Course Objectives:**

- Initiating the student to different building bye-laws and regulations.
- Imparting the planning aspects of residential buildings and public buildings.
- Giving training exercises on various signs and bonds.
- Giving training exercises on different building units.
- Imparting the skills and methods of planning of various buildings.

Course Outcomes:

- Plan various buildings as per the building bye-laws.
- Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
- Draw signs and bonds
- Draw different building units
- Learn the skills of drawing building elements and plan the buildings as per requirements.

Syllabus:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators & Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye-Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M.Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. National Building Code 2016 (Volume-I&II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai.
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGraw Hill Education (P) India Ltd. New Delhi.



II Year B.Tech. CE-I Semester

L	T	P	C
2	0	0	0

(23A100033)ENVIRONMENTAL SCIENCE**Course Objectives:**

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

UNIT I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grass land ecosystem
- Desert ecosystem.
- Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation– Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of:

- Air Pollution.
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

**UNIT IV**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. –Environment Protection Act. –Air (Prevention and Control of Pollution)Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act– Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References:

1. DeekshaDaveandE.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.AnjiReddy, “Textbook of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prenticehall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M.Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.
1. <https://www.coursera.org/learn/python-for-applied-data-science-ai>
2. <https://www.coursera.org/learn/python?specialization=python#syllabus>



II Year B.Tech. CE–II Semester

L	T	P	C
2	0	0	2

(23A100701a)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**Course Objectives:**

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

- Define the concepts related to Managerial Economics, financial accounting and management(L2)
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
- Apply the Concept of Production cost and revenues for effective Business decision (L3)
- Analyze how to invest their capital and maximize returns(L4)
- Evaluate the capital budgeting techniques.(L5)
- Develop the accounting statements and evaluate the financial performance of business entity (L5)

UNIT-I Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand- Demand Elasticity- Types– Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT-II Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT-III Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietary- Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT-IV Capital Budgeting

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting–Features,Proposals,MethodsandEvaluation.Projects–PayBack



Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT- V Financial Accounting and Analysis

Introduction–Concepts and Conventions- Double-Entry Book keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

1. Ahuja Hl Managerial economics Schand.
2. S.A.Siddiqui and A.S.Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

<https://www.slideshare.net/123ps/managerial-economics-ppt>
<https://www.slideshare.net/rossanz/production-and-cost-45827016>
<https://www.slideshare.net/darkyla/business-organizations-19917607>
<https://www.slideshare.net/balarajbl/market-and-classification-of-market>
<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>
<https://www.slideshare.net/ashu1983/financial-accounting>



II Year B.Tech. CE–II Semester

L	T	P	C
2	0	0	2

(23A100701b)ORGANISATIONAL BEHAVIOUR**Course Objectives:**

- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

Course Outcomes:

- Define the Organizational Behaviour, its nature and scope.(L2)
- Understand the nature and concept of Organizational behaviour(L2)
- Apply theories of motivation to analyse the performance problems(L3)
- Analyse the different theories of leadership(L4)
- Evaluate group dynamics(L5)
- Develop as powerful leader(L5)

UNIT- I Introduction to Organizational Behavior

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning –Personality.

UNIT- II Motivation and Leading

Theories of Motivation- Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Clelland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

UNIT-III Organizational Culture

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

UNIT-IV Group Dynamics

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

UNIT- V Organizational Change and Development

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Textbooks:

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12th edition.
2. P SubbaRan, Organisational Behaviour, Himalya Publishing House.



Reference Books:

1. McShane, Organizational Behaviour, TMH
2. Nelson, Organisational Behaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson.
4. Aswathappa, Organisational Behaviour, Himalaya.

Online Learning Resources:

<https://www.slideshare.net/Knight1040/organizational-culture9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714> <https://www.slideshare.net/harshrastogi1/group-dynamics-159412405>
<https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951>



II Year B.Tech. CE–II Semester

L	T	P	C
2	0	0	2

(23A100701c) BUSINESS ENVIRONMENT**Course Objectives:**

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monetary policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

Course Outcomes:

- Define Business Environment and its Importance.(L2)
- Understand various types of business environment.(L2)
- Apply the knowledge of Money markets in future investment(L3)
- Analyze India's Trade Policy(L4)
- Evaluate fiscal and monetary policy(L5)
- Develop a personal synthesis and approach for identifying business opportunities (L5)

UNIT-I Overview of Business Environment

Introduction – meaning Nature, Scope, significance, functions and advantages. Types- Internal & External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis.

UNIT-II Fiscal & Monetary Policy

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues- Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy- Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

UNIT-III India's Trade Policy

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

UNIT-IV World Trade Organization

Introduction– Nature, significance, functions and advantages. Organization and Structure- Role and functions of WTO in promoting world trade- GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

UNIT-V Money Markets and Capital Markets

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges -Investor protection and role of SEBI, Introduction to international finance.



Textbooks:

1. Francis Cherunilam, International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition. HPH

Reference Books:

1. K.V. Sivayya, V.B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S.N, International Business, Wiley India.
4. E. Bhattacharya, International Business, Excel Publications, New Delhi.

Online Learning Resources:

<https://www.slideshare.net/ShompaDhali/business-environment-53111245>
<https://www.slideshare.net/rbalsells/fiscal-policy-ppt>
<https://www.slideshare.net/aguness/monetary-policy-presentationppt>
<https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982>
<https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt>
<https://www.slideshare.net/viking2690/wto-ppt-60260883>
<https://www.slideshare.net/prateeknepal3/ppt-mo>



II Year B.Tech. CE–II Semester

L	T	P	C
3	0	0	3

(23A101205T)ENGINEERING GEOLOGY**Course Objectives:**

- To know the importance of Engineering Geology to the Civil Engineering.
- To enable the students understand what minerals and rocks are and their formation and identification.
- To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
- To enable the student realize its importance and applications of Engineering Geology in Civil Engineering constructions.
- Concepts of Ground water and its geophysical methods

Course Outcomes:

- Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.
- Identify and understand the properties of Minerals and Rocks.
- Understand the concepts of Ground water and its geophysical methods.
- Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.
- Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.

SYLLABUS:**UNIT-I:**

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies, weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT-II

Mineralogy And Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

Structural Geology: Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

**UNIT-IV**

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic belts, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

Textbooks:

1. Engineering Geology by N.Chenna Kesavulu, Laxmi Publications.2nd Edn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th2023

References:

1. Engineering Geology by Subinoy Gangopadhyay Oxford University press1st edition, 2012.
2. Engineering Geology by D.VenkatReddy, Vikas Publishing, 2nd Edn, 2017,
3. Geology for Engineers and Environmental Society' Alan EKeheew, 3rd edn., 2013)Pearson publications.
4. 'Environmental Geology'(2013) K.S.Valdiya,2nd ed., Mc Graw Hill Publications.

Web Materials:

1. <http://nptel.iitm.ac.in/video.php?subjectId=105105106>
2. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=1>
4. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=3>
5. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=4>



II Year B.Tech. CE–II Semester

L	T	P	C
3	0	0	3

(23A101206T) CONCRETE TECHNOLOGY**Course Objectives**

- Learn materials and their properties used in the production of concrete
- Learn the behavior of concrete at fresh stage
- Learn the behavior of concrete at hardened stage
- Learn the influence of elasticity, creep and shrinkage on concrete
- Learn the mix design methodology and special concretes

Course Outcomes:

- CO1 Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
- CO2 Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.
- CO3 Evaluate the ingredients of concrete through lab test results. realise the importance of quality of concrete
- CO4 Understand the behavior of concrete in various environments.
- CO5 Familiarize the basic concepts of special concrete and their production and applications.

UNIT- I

CEMENTS: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Maximum aggregate size- Quality of mixing water

UNIT-II

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

UNIT-III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing,



Testing of Hardened Concrete: Compression test –Tension test –Factors affecting strength– Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT-IV

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT- V

MIX DESIGN & SPECIAL CONCRETES: Ready mixed concrete, Fibre reinforced concrete–Different types of fibres–Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self-healing concrete.

Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method

Textbooks:

1. Properties of Concrete by A.M.Neville–PEARSON–4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.
3. Concrete Technology by Job Thomas, Cengage Publications, 1st edition, 2015

References

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
2. Concrete Technology, J.J.Brooks and A.M.Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M.S.Shetty.–S.Chand&Co.;2004
4. Concrete Technology by A.R.Santha Kumar, Oxford University Press, New Delhi



II Year B.Tech. CE–II Semester

L	T	P	C
3	0	0	3

(23A101207) STRUCTURAL ANALYSIS**Course Objectives**

Learn energy theorems
 Learn the analysis of indeterminate structures
 Analysis of fixed and continuous beams
 Learn about slope-deflection method
 Learn about Moment–distribution method

Course Outcomes:

- Apply energy theorems to analyze trusses
- Analyze indeterminate structures by using Castigliano's–II theorem
- Analysis of fixed and continuous beams
- Analyze continuous beams and portal frames by using slope-deflection method
- Analyze continuous beams and portal frames by using Moment–distribution method

UNIT-I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem Deflections of simple beams and pin jointed trusses.

UNIT-II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with up to two degrees of internal and external indeterminacies – Castigliano's–II theorem.

UNIT-III

FIXED BEAMS - CONTINUOUS BEAMS: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT-IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

UNIT-V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.



Textbooks:

1. Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata Mc GrawHill Publishers.3rd edition 2017.

Reference Books:

1. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.P Perumal–Laxmi publications. 3rd 2016
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis–D.S.Prakasarao - Univeristy press.
- 5 Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.



II Year B.Tech. CE–II Semester

L	T	P	C
3	0	0	3

(23A101208) HYDRAULICS AND HYDRAULIC MACHINERY**Pre-requisite: Fluid Mechanics****Course Objectives:**

- To Introduce concepts of laminar and turbulent flows
- To teach principles of uniform flows through open channel.
- To teach principles of non-uniform flows through open channel.
- To impart knowledge on design of turbines.
- To impart knowledge on design of pumps

Course Outcomes:

COs	STATEMENTS	Blooms level
CO1	Understand the characteristics of laminar and turbulent flows.	L2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	L3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	L3
CO4	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	L5
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps	L2

UNIT-I

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT-II

Uniform flow in Open Channels: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT-III

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT-IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency Hydraulic Turbines: Classification of turbines; Pelton wheel and its design .Francis turbine and its



design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines.
Cavitation: causes and effects.

UNIT–V

Pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies

TEXTBOOKS:

1. P.M.Modi and S.M.Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K.Subrahmanya, Theory and Applications of Fluid Mechanics, Tata Mc Graw Hill, 2nd edition 2018

Reference Books:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. Fluid Mechanics by Frank M.White, Henry Xue, Tata Mc Graw Hill, 9th edition, 2022.
3. C.S.P.Ojha, R.Berndtsson and P.N.Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by SK Som, Gautam Biswas, S Chakraborty 3rd edition 2011

Online Learning Resources:

<https://nptel.ac.in/courses/105105203>
<https://archive.nptel.ac.in/courses/112/106/112106300>
<https://archive.nptel.ac.in/courses/112/103/112103249/>

**II Year B.Tech. CE–II Semester**

L	T	P	C
0	0	3	1.5

(23A101206P) CONCRETE TECHNOLOGY LABORATORY

Course Objectives: To test basic properties of ingredients of concrete fresh and hardened concrete properties

Course Outcomes:

- CO1 Outline importance of testing cement and its properties
- CO2 Assess different properties of Aggregates
- CO3 Assess fresh concrete properties and their relevance to hardened concrete
- CO4 Assess hardened concrete properties

Detailed Syllabus:**I. TESTS ON CEMENT**

1. Normal Consistency and Fineness of cement.
2. Initial setting time and Final setting time of cement. Specific gravity and soundness of cement.
3. Compressive strength of cement.

II. TESTS ON FINE AGGREGATES

4. Grading and fineness modulus of Fine aggregate by sieve analysis.
5. Specific gravity of fine aggregate
6. Water absorption and Bulking of sand.

III. TESTS ON COARSE AGGREGATES

7. Grading of Coarse aggregate by sieve analysis.
8. Specific gravity of coarse aggregate
9. Water absorption of Coarse aggregates

IV. TESTS ON FRESH CONCRETE

10. Workability of concrete by compaction factor method
11. Workability of concrete by slump test
12. Workability of concrete by Vee-bee test.

V. TESTS ON HARDENED CONCRETE

13. Compressive strength of cement concrete and Modulus of rupture
14. Young's Modulus and Poisson's Ratio
15. Split tensile strength of concrete.
16. Non-Destructive testing on concrete (for demonstration)

Note: Any 14 experiments may be completed



II Year B.Tech. CE–II Semester

L	T	P	C
0	0	3	1.5

(23A101205P) ENGINEERING GEOLOGY LABORATORY**Course Objectives:**

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection

Course Outcomes:

- Identify Megascopic minerals & their properties.
- Identify Megascopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography.
- Know the occurrence of materials using the strike & dip problems.

LIST OF EXPERIMENTS

- Physical properties of minerals: Mega-scopic identification of
 - Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
 - Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc...
- Megascopic description and identification of rocks.
 - Igneous rocks–Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
 - Sedimentary rocks–Sandstone, Ferruginous sand stone, Limestone, Shale, Laterite, Conglamorate, etc.
 - Metamorphic rocks–Biotite–Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
- Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
- Simple Structural Geology problems.
- Bore hole data.
- Strength of the rock using laboratory tests.
- Fieldwork–To identify Minerals, Rocks, Geomorphology & Structural Geology.

LAB EXAMINATION PATTERN:

- Description and identification of FOUR minerals
- Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
- ONE Question on Interpretation of a Geological map along with a geological section.
- TWO Questions on Simple strike and Dip problems.
- Bore hole problems.
- Project report on geology.

References:

- 'Applied Engineering Geology Practicals' by MT Mauthesha Reddy, New Age International Publishers, 2nd Edition.
- 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition 2009.



II Year B.Tech. CE–II Semester

L	T	P	C
0	1	2	2

(23A100034) SOFT SKILLS**Course Objectives:**

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes

- List out various elements of soft skills(L1, L2)
- Describe methods for building professional image(L1,L2)
- Apply critical thinking skills in problem solving(L3)
- Analyse the needs of an individual and team for well-being(L4)
- Assess the situation and take necessary decisions(L5)
- Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

UNIT I Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought –self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches-convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III Problem Solving & Decision Making

Meaning&featuresofProblemSolving–ManagingConflict–Conflictresolution–Team



building-Effective decision making in teams-Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views –formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT IV Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting– Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participant to narrate certain crisis and stress-ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT V Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette- Corporate grooming tips -Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study- Business Etiquette Games

NOTE:-

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra BarunK, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. AlexK, Soft Skills S.Chand & Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018



5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey)Publisher:Notion Press
6. Dr.Rajiv Kumar Jain,Dr.Usha Jain, Life Skills(Paper back English)Publisher: Vayu Education of India, 2014

Online Learning Resources:

1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. <https://youtu.be/-Y-R9hDI7IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>
7. <https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/>
8. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
9. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

**II Year B.Tech. CE–II Semester**

L	T	P	C
1	0	2	2

(23A103209) DESIGN THINKING & INNOVATION**Course Objectives:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

- Define the concepts related to design thinking.(L1,L2)
- Explain the fundamentals of Design Thinking and innovation(L1, L2)
- Apply the design thinking techniques for solving problems in various sectors.(L3)
- Analyse to work in a multi disciplinary environment(L4)
- Evaluate the value of creativity(L5)
- Formulate specific problem statements of real time issues(L3, L6)

UNIT I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.



UNIT V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Class room, Ulysses press
2. Shruti N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritina holden, Jill Butter.
4. Chesbrough, H., The Era of Open Innovation– 2013

Online Learning Resources:

<https://nptel.ac.in/courses/110/106/110106124/>
<https://nptel.ac.in/courses/109/104/109104109/>
https://swayam.gov.in/nd1_noc19_mg60/preview



COMMUNITY SERVICE PROJECT

Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.



- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one–
 - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water

EXPECTED OUT COMES**BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS****Learning Outcomes**

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development



- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereo types and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability



2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aquaculture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling level-observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program(Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality/Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films



6. Awareness Program on Good Touch and Bad Touch(Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social

Entrepreneurship General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AID Sawareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like–
 - i. Agriculture
 - ii. Health
 - iii. Marketing and Cooperation
 - iv. Animal Husbandry
 - v. Horticulture
 - vi. Fisheries
 - vii. Sericulture
 - viii. Revenue and Survey
 - ix. Natural Disaster Management
 - x. Irrigation
 - xi. Law & Order
 - xii. Excise and Prohibition
 - xiii. Mines and Geology
 - xiv. Energy

**Role of Students:**

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity**Duration: 8 weeks****1. Preliminary Survey(One Week)**

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty.(However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns(One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report(One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily log book need to be maintained by the students batch, which should be counter signed by the government alagency representative and the teacher-mentor, who is required to periodically visit the students and guide them.



B.TECH.-CIVIL ENGINEERING

III YEAR COURSE STRUCTURE & SYLLABI

III B.Tech. I Semester

S. No.	Course code	Title	L	T	P	Credits
1.	23A101301	Water Resources Engineering	3	0	0	3
2.	23A101302	Design Of Reinforced Concrete Structures	3	0	0	3
3.	23A101303T	Geotechnical Engineering	3	0	0	3
4.	23A101304a 23A101304b 23A101304c	Professional Elective-I 1. Pre-stressed Concrete 2. Air Pollution and Control 3. Environmental Impact Assessment	3	0	0	3
5.		Open Elective-I	3	0	0	3
6.	23A101303P	Geotechnical Engineering Lab	0	0	3	1.5
7.	23A101306	Fluid Mechanics Hydraulic Machines Lab	0	0	3	1.5
8.	23A101307	Skill oriented course Estimation, Specifications, Costing & Valuation	0	1	2	2
9.	23A104306P	Tinkering Lab	0	0	2	1
10.	23A101315	Evaluation of Community Service Internship	-	-	-	2
11	23A104320	Introduction To Quantum Technologies and Applications (Qualitative Treatment)	3	0	0	3
Total			15	1	10	26

Open Elective – I

S. No.	Course Code	Course Name	Offered by the Dept.
1	23A102305	Electrical Safety Practices and Standards	EEE
2	23A103505	Sustainable Energy Technologies	ME
3	23A104313	Electronic Circuits	ECE
4	23A105304	Java Programming	CSE& Allied/IT
5	23A133312	Introduction to Artificial Intelligence	
6	23A100035	Mathematics for Machine Learning and AI	Mathematics
7	23A100036	Materials Characterization Techniques	Physics
8	23A100037	Chemistry of Energy Systems	Chemistry
9	23A100038	English for Competitive Examinations	Humanities
10	23A100039	Entrepreneurship and New Venture Creation	

Note:

1. A student is permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Minor from V Semester onwards.
2. A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.
3. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline



III B.Tech. II Semester

S.No.	Course code	Title	L	T	P	Credits
1.	23A101308	Design of Steel Structures	3	0	0	3
2.	23A101309T	Highway Engineering	3	0	0	3
3.	23A101310T	Environmental Engineering	3	0	0	3
4.	23A101311a 23A101311b 23A101311c	Professional Elective-II 1. Design of Earthquake Resistant Structures 2. Open Channel Flow 3. Foundation Engineering	3	0	0	3
5.	23A101312a 23A101312b 23A101312c	Professional Elective-III 1. Cost effective Housing Techniques 2. Watershed Management 3. Advanced Structural Analysis	3	0	0	3
6.		Open Elective-II	3	0	0	3
7.	23A101309P	Highway Engineering Lab	0	0	3	1.5
8.	23A101310P	Environmental Engineering Lab	0	0	3	1.5
9.	23A101314	Skill oriented course Building Information Modelling	0	1	2	2
10.	23A100043	Mandatory noncredit course Technical paper writing & IPR	2	0	0	-
11.	23A101315	Workshop	0	0	0	0
Total			20	1	8	23

Mandatory Industry Internship of 08 weeks duration during summer vacation

Open Elective – II

S. No.	Course Code	Course Name	Offered by the Dept.
1	23A102312	Renewable Energy Sources	EEE
2	23A103311	Automation and Robotics	ME
3	23A104315	Digital Electronics	ECE
4	23A132302T	Operating Systems	CSE& Allied/IT
5	23A133313	Machine Learning	
6	23A100044	Optimization Techniques	Mathematics
7	23A100040	Physics Of Electronic Materials and Devices	Physics
8	23A100041	Chemistry Of Polymers and Applications	Chemistry
9	23A100042	Academic Writing and Public Speaking	Humanities



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code		WATER RESOURCES ENGINEERING									L	T	P	C
23A101301											3	0	0	3
Course Objectives: The objectives of this course are to make the student to: 1. Understand the fundamental concepts of hydrology, including precipitation, evaporation, infiltration, and runoff, and their significance in water resource management. 2. Analyze hydrographs, unit hydrographs, and groundwater characteristics for estimating water availability and flood management. 3. Evaluate the necessity, importance, and methods of irrigation, along with soil-water-plant relationships and irrigation efficiencies. 4. Apply silt theories and principles of canal design to ensure efficient water conveyance and management in irrigation systems. 5. Assess the principles of diversion head works, water logging, canal lining, and the stability of hydraulic structures on permeable foundations.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain the hydrologic cycle, precipitation types, and measurement techniques for rainfall, evaporation, infiltration, and runoff computation. 2. Analyze hydrographs, unit hydrographs, and groundwater flow parameters for flood estimation and water resource planning. 3. Evaluate irrigation requirements, soil-water-plant relationships, duty, delta, and irrigation efficiencies for sustainable agricultural productivity. 4. Apply silt theories and design principles of irrigation canals to ensure effective water conveyance and prevent water logging. 5. Assess the stability of diversion head works, including weirs and barrages, using Bligh ‘s and Khosla ‘s theories for hydraulic structure design.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	2	-	-	-	-	2	-	2	2	2
CO-2	3	3	3	3	3	-	-	-	-	2	-	2	3	2
CO-3	3	3	3	3	2	-	-	-	-	2	-	2	3	3
CO-4	3	3	3	3	3	3	3	3	-	2	-	2	3	3
CO-5	3	3	3	3	3	2	2	2	-	2	-	2	3	3
UNIT-I														
INTRODUCTION to HYDROLOGY: Engineering Hydrology and Its Applications; Hydrologic Cycle; Precipitation- Types and forms, Rainfall Measurement, Types of Rain Gauges, Computation of Average Rainfall Over a Basin, Presentation and Interpretation of Rainfall Data. Evaporation- Factors Affecting Evaporation, Measurement of Evaporation; Infiltration- Factors Affecting Infiltration, Measurement of Infiltration, Infiltration Indices; Runoff-Factors Affecting Run-off, Computation of Run-Off; Design Flood; Estimation of Maximum Rate of Run-Off; Separation of Base Flow.														
UNIT-II														
HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph-Construction and Limitations of Unit Hydrograph,														



Application of The Unit Hydrograph to The Construction of a Flood Hydrograph Resulting from Rainfall of Unit Duration; S-Hydrograph. GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; Aquifer Parameters Porosity, Specific Yield, Specific Retention; Divisions of Sub-Surface Water; Water Table; Types of Aquifers; Storage Coefficient-Coefficient of Permeability and Transmissibility

UNIT– III**IRRIGATION:**

Introduction, Necessity and Importance of Irrigation, Advantages and Ill Effects of Irrigation, Types of Irrigation, Methods of Application of Irrigation Water, and Quality of Irrigation Water. Duty and Delta, Duty at Various Places, Relation Between Duty and Delta, Factors Affecting Duty, and Methods of Improving Duty.

WATER REQUIREMENT OF CROPS Types of Soils, Indian Agricultural Soils, Preparation of Land for Irrigation. Soil Fertility, Soil-Water-Plant Relationship; Vertical Distribution of Soil Moisture, Soil Moisture Tension, Soil Moisture Stress, Various Soil Moisture Constants, Limiting Soil Moisture Conditions. Depth and Frequency of Irrigation, Gross Command Area, Culturable Command Area, Culturable Cultivated and Uncultivated Area, KorDepth and KorPeriod, Crop Seasons, and Crop Rotation; Irrigation Efficiencies; Determination of Irrigation Requirements of Crops, Assessment of Irrigation Water, Consumptive Use of Water -Factors Affecting Consumptive Use, Direct Measurement, and Determination by Use of Equations (Theory Only).

UNIT– IV**CHANNELS– SILT THEORIES:**

Classification; Canal Alignment; Inundation Canals; Cross-Section of An Irrigation Channel; Balancing Depth; Borrow Pit; Spoil Bank; Land Width; Silt Theories–Kennedy ‘s Theory, Kennedy ‘s Method of Channel Design; Drawbacks in Kennedy ‘s Theory; Lacey ‘s Regime Theory- Lacey ‘s Theory Applied to Channel Design; Defects in Lacey ‘s Theory; Comparison of Kennedy ‘s and Lacey ‘s Theory.

WATER LOGGING and CANAL LINING: Water Logging; Effects of Water Logging; Causes of Water Logging; Remedial Measures; Saline and Alkaline Soils and their Reclamation; Losses inCanal; Lining of Irrigation Channels – Necessity, Advantages and Disadvantages; Types of Lining; Design of Lined Canal.

UNIT– V**DIVERSION HEAD WORKS:**

Types of Diversion Head Works; Diversion and Storage Head Works; Weirs and Barrages; Layouts of Diversion Head Works; Components; Causes and Failure of Hydraulic Structures on Permeable Foundations; Bligh’s Creep Theory; Khosla’s Theory; Determination of Uplift Pressure, Impervious Floors Using Bligh ‘s and Khosla ‘s Theory; Exit Gradient.

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi Publications Pvt. Ltd., New Delhi, 17th Edition, 2021.
2. Engineering Hydrology by K. Subramanya, The Tata McGraw-Hill Company, Delhi, 5th Edition, 2020.

REFERENCEBOOKS:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publishers, Delhi, 36th Edition.
2. Engineering Hydrology by Jayarami Reddy, Laxmi Publications Pvt. Ltd., New Delhi, 3rd Edition, 2016.
3. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House, 6th Edition, 2020.

OnlineLearningResources:

<https://nptel.ac.in/courses/105101214>



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code		DESIGN OF REINFORCED CONCRETE STRUCTURES									L	T	P	C
23A101302											3	0	0	3
Course Objectives: The objectives of this course are to make the student: Understand the fundamental methods of concrete structure design, including elastic, ultimate load, and limit state methods. Analyze and design reinforced concrete beams, slabs, staircases, columns, and footings using the Limit State Method as per IS codes. Evaluate the behavior of reinforced concrete members in terms of flexure, shear, torsion, bond, and anchorage. Apply design principles to ensure serviceability and safety of concrete structures under various loading conditions. Develop skills to use design aids and professional software for the analysis and design of RC structures.														
Course Outcomes: Upon successful completion of this course, students will be able to: Explain the different methods of concrete structure design and their advantages. Analyze and design singly and doubly reinforced beams, flanged beams, slabs, and staircases using the Limit State Method. Evaluate the behavior of RC members under shear, torsion, and combined loading conditions. Design short columns and footings considering axial and eccentric loading conditions. Utilize IS code provisions and design aids for efficient structural design.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	-	-	-	-	-	2	-	2	3	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	3	2
CO-3	3	2	2	2	2	-	-	-	-	-	-	1	2	2
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-5	2	2	2	1	3	-	-	-	-	2	1	2	2	2
UNIT– I														
METHODS OF DESIGN OF CONCRETE STRUCTURES Concept of Elastic Method, Ultimate Load Method, and Limit State Method – Working Stress Method as detailed in IS Code – Design of Singly Reinforced Beam by Working Stress Method – Limit State Philosophy as detailed in IS Code – Advantages of Limit State Method over other methods – Analysis and Design of Singly and Doubly Reinforced Rectangular Beams by Limit State Method.														
UNIT– II														
LIMIT STATE METHOD –FLANGED BEAM, SHEAR & TORSION														



Analysis and Design of Flanged Beams – Use of Design Aids for Flexure - Behaviour of RC Members in Bond and Anchorage-Design Requirements as Per Current Code- Behaviour of RC Beams in Shear and torsion - Design of RC Members for Combined Bending, Shear and torsion - Serviceability.

UNIT– III**LIMIT STATE DESIGN of SLABS and STAIRCASE**

Analysis and Design of Cantilever, One Way, Two Way and Continuous Slabs Subjected to Uniformly Distributed Load for Various Boundary Conditions- –Introduction to Flat Slab.

UNIT– IV**LIMIT STATE DESIGN of COLUMNS**

Types of Columns – Design of Short Rectangular and Circular Columns for Axial, Uniaxial and Biaxial Bending.

LIMIT STATE DESIGN of FOOTING

Design of Wall Footing – Design of Axially and Eccentrically Loaded Rectangular Pad and Sloped Footings – Design of Combined Rectangular Footing for Two Columns Only.

UNIT– V

LIMIT STATE of SERVICEABILITY and MISCELLANEOUS (Aspects of Deflection, Cracking aspects) Types of Staircases – Design of Dog-Legged Staircase

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Limit State Design, Laxmi Publications Pvt. Ltd., New Delhi
2. P.C.Varghese, Limit State—Designed of Reinforced Concrete, Prentice Hall of India, New Delhi

REFERENCEBOOKS:

1. N. Krishnaraju, Structural Design and Drawing, Universities Press Pvt. Ltd., Hyderabad, 4th Edition, 2020.
2. N. C. Sinha and S. K. Roy, Fundamentals of Reinforced Concrete, S. Chand Publishers.
3. N. Subramanian, Design of Reinforced Concrete Structures, Oxford University Press.

OnlineLearningResources:

<https://archive.nptel.ac.in/courses/105/105/105105105/>

Codes/Tables:

IS 456-2000 and relevant sheets (pertaining to columns) of SP 16 code books are to be permitted into the examination hall.

NOTE:

Assignment on preparation of drawing sheets detailing various RC elements.

All the designs are to be taught using the Limit State Method.

The following plates should be prepared by the students:

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of one-way, two-way, and continuous slabs.

Exam Pattern:

The end examination paper should consist of Part A and Part B.

- Part A consists of two questions in Design and Drawing, out of which one question is to be answered.
- Part B should consist of five questions on design, out of which three are to be answered.
- Weight age for Part A is 40%, and Part B is 60%



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code	GEOTECHNICAL ENGINEERING				L	T	P	C						
23A101303T					3	0	0	3						
Course Objectives: The objectives of this course are to make the student to: 1. Understand the classification and compaction characteristics of different soil types and their engineering significance. 2. Analyze the concepts of effective stress, permeability, and seepage in soils and their impact on soil behavior. 3. Apply stress distribution theories and settlement computations to evaluate soil response under loads. 4. Evaluate shear strength properties of soil using various testing methods and their applications in geotechnical engineering. 5. Assess the stability of slopes using different analytical methods and suggest suitable slope protection measures.														
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Classify soils based on their physical and index properties as per BIS and Unified Classification Systems. 2. Analyze soil permeability and seepage problems using Darcy’s law and flow net concepts. 3. Apply stress distribution theories and settlement analysis to predict soil behavior under loading. 4. Evaluate shear strength of soils using experimental methods and interpret test results. 5. Assess slope stability and recommend suitable protection measures.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	-	-	-	-	-	2	-	2	3	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	3	2
CO-3	3	2	2	2	2	-	-	-	-	-	-	1	2	2
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-5	2	2	2	1	3	-	-	-	-	2	1	2	2	2
UNIT– I														
SOIL CLASSIFICATION and COMPACTION Formation of Soil - Soil Description – Particle – Size Shape and Colour – Composition of Gravel, Sand, Silt, Clay Particles – Particle Behavior – Soil Structure – Phase Relationship – Index Properties – Significance – BIS Classification System – Unified Classification System – Compaction of Soils–Theory, Laboratory and Field Tests–Field Compaction Methods– Factors Influencing Compaction of Soils.														



UNIT– II		
EFFECTIVE STRESS and PERMEABILITY Soil - Water – Static Pressure in Water - Effective Stress Concepts in Soils – Capillary Phenomena– Permeability Interaction – Hydraulic Conductivity – Darcy ‘s Law – Determination of Hydraulic Conductivity – Laboratory Determination (Constant Head and Falling Head Methods) and Field Measurement Pumping Out in Unconfined and Confined Aquifer – Factors Influencing Permeability of Soils – Seepage - Two-Dimensional Flow – Laplace ‘s Equation – Introduction to Flow Nets – Simple Problems. (Sheet Pile and Weir).		
UNIT– III		
STRESS DISTRIBUTION and SETTLEMENT Stress Distribution in Homogeneous and Isotropic Medium – Boussinesq Theory (Point Load, Line Load, and UDL); use of New mark’s Influence Chart – Components of Settlement: Immediate and Consolidation Settlement – Terzaghi’s One-Dimensional Consolidation Theory – Computation of Rate of Settlement using $\sqrt{T}$ and Log T Methods –E-log P Relationship.		
UNIT– IV		
SHEARSTRENGTH Shear Strength of Cohesive and Cohesion Less Soils – Mohr-Coulomb Failure Theory – Measurement of Shear Strength - Direct Shear, Tri-axial Compression, UCC and Vane Shear Tests – Pore Pressure Parameters – Cyclic Mobility – Liquefaction.		
UNIT– V		
SLOPE STABILITY Stability analysis- Infinite slopes and Finite slopes – Total stress analysis for saturated clay – Friction Circle Method – Use of Stability Number – Method of Slices – Fellenious and Bishop’s Method – Slope protection measures.		
TEXT BOOKS:		
1. Soil Mechanics and Foundation Engineering by K. R. Arora, Standard Publishers and Distributors, Delhi, 7th Edition, 2009. 2. Geotechnical Engineering by C. Venkataramiah, New Age International Pvt. Ltd., 2002.		
REFERENCEBOOKS:		
1. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi, 17th Edition, 2017. 2. Geotechnical Engineering by Iqbal H. Khan, PHI Publishers, 4th Edition. 3. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Pvt. Ltd., New Delhi, 3rd Edition, 2016.		
OnlineLearningResources:		
https://nptel.ac.in/courses/105101201 https://nptel.ac.in/courses/10510515		



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code					PRESTRESSED CONCRETE (PE–I)					L	T	P	C	
23A101304a										3	0	0	3	
Course Objectives: - The objectives of this course are to make the student: 1. Understand the principles, methods, and materials used in prestressed concrete. 2. Analyze various losses of prestress in both pre-tensioned and post-tensioned members. 3. Design prestressed concrete beams considering flexure and shear forces. 4. Evaluate deflections in prestressed concrete structures and their controlling factors. 5. Analyze the behavior of composite beams under different loading conditions.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain the principles and methods of prestressing and the need for high-strength materials. 2. Analyze the different types of prestress losses and their impact on structural performance. 3. Design prestressed concrete beams considering flexural and shear stresses. 4. Evaluate deflections in prestressed beams and suggest control measures. 5. Analyze the stress distribution and differential shrinkage in composite beams.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	2	1	1	-	-	1	-	-	-	1	-	1	1	1
CO-2	2	2	1	1	2	-	-	-	-	-	-	1	1	1
CO-3	2	2	3	2	2	-	1	-	-	-	-	1	2	2
CO-4	2	1	2	2	3	1	-	-	-	-	-	1	2	1
CO-5	2	2	2	1	2	1	-	-	-	-	-	1	2	1
UNIT– I														
Introduction Principles of Pre-Stressing – Prestressing Systems - Pre-Tensioning and Post Tensioning- Advantages and Limitations of Pre-Stressed Concrete- Need for High Strength Materials. Methods of Pre-Stressing: Pre-Tensioning (Hoyer System) and Post-Tensioning Methods (Freyssinet System and Gifford- Udall System)														
UNIT– II														
Losses of pre-stress Loss of Pre-Stress in Pre-Tensioned and Post-Tensioned Members Due to Elastic Shortening, Shrinkage and Creep of Concrete, Relaxation of Stress in Steel, Anchorage Slip and Frictional Losses.														
UNIT– III														
Flexural and Shear Analysis of beams for flexure and shear – Beams pre-stressed with straight, concentric,														



Eccentric, Bent, and parabolic Tendons – Kern line – Cable profile – Design of PSC beams (Rectangular and I-sections) using IS 1343 – Analysis and design of rectangular and I-beams for shear – Introduction to transmission length and end block (no design and analytical problems).

UNIT– IV**DEFLECTIONS**

Control of Deflections-Factors Influencing Deflections - Short Term Deflections of Uncracked Beams- Prediction of Long Time Deflections

UNIT– V**Composite beams**

Different Types - Propped and Un-Propped - Stress Distribution - Differential Shrinkage- Analysis of Composite Beams.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill Publications 6th edition 2018
2. Prestressed concrete by N. Rajagopalan, NarosaPublishingHouse2ndedition 2017

REFERENCEBOOKS:

1. Design of Prestressed Concrete Structures by T. Y. Lin & Ned H. Burns, John Wiley & Sons, 3rd Edition, 2010.
2. Prestressed Concrete Design by Praveen Nagarajan, Pearson Publications, 2013.
3. Prestressed Concrete by Ramamrutham, Dhanpat Rai Publications, 2020 Edition.
4. BIS Code on “Prestressed Concrete”, IS:1343 is to be permitted into the examination hall.

OnlineLearningResources:

<https://archive.nptel.ac.in/courses/105/106/105106118/https://nptel.ac.in/courses/10510617>



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code		AIR POLLUTIONAND CONTROL (PE – I)								L	T	P	C	
23A101304b										3	0	0	3	
Course Objectives:														
The objectives of this course are to make the student:														
1. Understand the sources, classification, and effects of air pollution on humans and the environment. 2. Analyze meteorological factors influencing air pollution and dispersion modeling. 3. Design and evaluate control measures for particulate pollutants. 4. Apply techniques for controlling gaseous pollutants through chemical and physical processes. 5. Assess vehicular and indoor air pollution and propose control strategies.														
Course Outcomes (COs):														
After successful completion of this course, students will be able to:														
1. Explain the sources, classification, and global effects of air pollution. 2. Analyze meteorological parameters affecting air pollution dispersion. 3. Design control systems for particulate matter using appropriate removal techniques. 4. Apply suitable technologies for gaseous pollutant removal through adsorption, absorption, and combustion. 5. Evaluate vehicular and indoor air pollution sources and suggest mitigation strategies.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	2	1	-	-	-	2	3	-	-	1	-	1	1	1
CO-2	2	2	-	2	2	3	3	-	-	-	-	1	2	2
CO-3	2	2	3	2	2	3	3	-	-	-	-	1	2	2
CO-4	2	1	2	2	3	3	3	-	-	-	-	1	2	2
CO-5	2	2	2	2	2	3	3	2	-	-	-	1	2	2
UNIT– I														
Air Pollution:														
Definition - Sources & Classification of Air Pollutants - Effects of Air Pollution on Humans, Plants and Materials- Global Effects - Air Quality and NAAQS - National Clean Air Programme- Sampling of Pollutants in Ambient Air - Stack Sampling														
UNIT– II														
Meteorology and Air Pollution:														
Factors Influencing Air Pollution, Wind Rose, Mixing Depths, Lapse Rates and Dispersion - Atmospheric Stability, Plume Rise and Dispersion, Prediction of Air Quality, Box Model - Gaussian Model - Dispersion Coefficient - Application of Tall Chimney for Pollutant Dispersion.														



UNIT– III		
Control of Particulate Pollutants: Properties of Particulate Pollution - Particle Size Distribution - Control Mechanism - Dust Removal Equipment - Design and Operation of Settling Chambers, Cyclones, Wet Dust Scrubbers, Fabric Filters & ESP.		
UNIT– IV		
Control of Gaseous Pollutants: Process and Equipment for The Removal by Chemical Methods - Design and Operation of Absorption and Adsorption Equipment - Combustion and Condensation Equipment.		
UNIT– V		
Automobile and Indoor Pollution: Vehicular Pollution – Sources and Types of Emission – Effect of Operating Conditions- Alternate Fuels and Emissions-Emission Controls and Standards, Strategies to Control Automobile Pollution– Causes of Indoor Air Pollution-Changes in Indoor Air Quality- Control and Air Cleaning Systems-Indoor Air Quality		
TEXT BOOKS:		
1. Rao, M. N. and Rao, H. V. N., Air Pollution, Tata McGraw-Hill, New Delhi, 2007. 2. Khare, M., Sharma, P., Kota, S. H., Sumanth, C., Air Pollution Science, Engineering and Management Fundamentals, CRC Press, 2024. 3. Noel, D. N., Air Pollution Control Engineering, Tata McGraw-Hill Publishers, 1999.		
REFERENCEBOOKS:		
1. Fundamentals of Air Pollution by Dr. B. S. N. Raju, Oxford & I.B.H. 2. Air Pollution Control Engineering by Nevers, McGraw-Hill, Inc., 2000. 3. Environmental Pollution Control Engineering by C. S. Rao, New Age International, New Delhi, 2006. 4. Pollution Control in Process Industries by S. P. Mahajan, Tata McGraw-Hill Publishing Company, New Delhi, 1991. 5. Environmental Engineering by H. S. Peavy, D. R. Rowe, and G. Tchobanoglous, McGraw-Hill, New York, 1985.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/107/105107213/		



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code		ENVIRONMENTAL IMPACTASSESSMENT (PE – I)		L	T	P	C							
23A101304c				3	0	0	3							
Course Objectives:														
The objectives of this course are to make the student:														
1. Understand the principles, methodologies, and significance of Environmental Impact Assessment (EIA). 2. Analyze the impact of developmental activities on land use, soil, and water resources. 3. Evaluate the impact of development on vegetation, wildlife, and assess environmental risks. 4. Develop environmental audit procedures and assess compliance with environmental regulations. 5. Understand and apply environmental acts, notifications, and legal frameworks in EIA studies.														
Course Outcomes (COs):														
Upon successful completion of the course, students will be able to:														
1. Apply various methodologies for conducting Environmental Impact Assessments. 2. Analyze the impact of land-use changes on soil, water, and air quality. 3. Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments. 4. Develop environmental audit reports and assess compliance with environmental policies. 5. Interpret and apply environmental acts and regulations related to EIA.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	2	3	-	-	-	-	-	1	2	2
CO-2	3	3	3	2	2	3	-	-	-	-	-	1	3	2
CO-3	3	3	3	2	2	3	3	-	-	-	-	1	3	3
CO-4	3	3	3	3	2	3	3	-	-	-	-	1	3	3
CO-5	2	2	2	2	2	3	3	3	-	-	-	1	2	2
UNIT– I														
Concepts and methodologies of EIA														
Initial Environmental Examination, Elements of EIA, - Factors Affecting E-I-A Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters- Criteria for The Selection of EIA Methodology, E I A Methods, Ad-Hoc Methods, Matrix Methods, Network Method Environmental Media Quality Index Method, Overlay Methods and Cost/Benefit Analysis.														
UNIT– II														
Impact of Developmental Activities and Land Use														
Introduction and Methodology for The Assessment of Soil and Ground Water, Delineation														



of Study Area, Identification of Actives. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures. E I A in Surface Water, Air and Biological Environment: Methodology for The Assessment of Impacts on Surface Water Environment, Air Pollution Sources, Generalized Approach for Assessment of Air Pollution Impact.

UNIT– III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of Development Activities on Vegetation and Wildlife, Environmental Impact of Deforestation – Causes and Effects of Deforestation - Risk Assessment and Treatment of Uncertainty-Key Stages in Performing Environmental Risk Assessment-Advantages of Environmental Risk Assessment.

UNIT– IV

Environmental audit

Introduction - Environmental Audit & Environmental Legislation Objectives of Environmental Audit, Types of Environmental Audit, Audit Protocol, Stages of Environmental Audit, Onsite Activities, Evaluation of Audit Data and Preparation of Audit Report

UNIT– V

Environmental Acts and Notifications

The Environmental Protection Act, The Water Preservation Act, The Air (Prevention & Control of Pollution Act), Wild Life Act - Provisions in The EIA Notification, Procedure for Environmental Clearance, Procedure for Conducting Environmental Impact Assessment Report - Evaluation of EIA Report. Environmental Legislation Objectives, Evaluation of Audit Data and Preparation of Audit Report. Post Audit Activities, Concept of ISO and ISO 14000.

TEXT BOOKS:

1. Environmental Impact Assessment Methodologies by Y. Anjaneyulu, B. S. Publication, Hyderabad, 2nd Edition, 2011.
2. Environmental Impact Assessment by Canter Larry W., McGraw-Hill Education, 1st Edition, 1996.

REFERENCEBOOKS:

1. Environmental Engineering by Peavy, H. S., Rowe, D. R., and Tchobanoglous, G., McGraw-Hill International Editions, New York, 1985.
2. Environmental Science and Engineering by Suresh K. Dhaneja, S. K. Kataria & Sons Publication, New Delhi.
3. Environmental Science and Engineering by J. Glynn and Gary W. Heinke, Prentice Hall Publishers.
4. Environmental Pollution and Control by H. S. Bhatia, Galgotia Publication (P) Ltd., Delhi.

Online Learning Resources:

<https://archive.nptel.ac.in/courses/124/107/124107160/>



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code	GREEN BUILDINGS				L	T	P	C						
23A101305a	(OPEN ELECTIVE -I)				3	0	0	3						
Course Objectives: The objectives of this course are to make the student: 1. To understand the fundamental concepts of green buildings, their necessity, and sustainable features. 2. To analyze green building concepts, rating systems, and their benefits in India. 3. To apply green building design principles, energy efficiency measures, and renewable energy sources. 4. To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings. 5. To assess material conservation strategies, waste management, and indoor environmental quality in green buildings.														
Course Outcomes (COs): Upon successful completion of the course, students will be able to: 1. Understand the importance of green buildings, their necessity, and sustainable features. 2. Analyze various green building practices, rating systems, and their impact on environmental sustainability. 3. Apply principles of green building design to enhance energy efficiency and incorporate renewable energy sources. 4. Evaluate HVAC systems, energy-efficient air conditioning techniques, and their role in sustainable building design. 5. Assess material conservation techniques, waste reduction strategies, and indoor air quality management in green buildings.														
CO-PO Articulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	-	-	-	-	2	3	-	-	-	-	-	3	3
CO-2	-	3	-	-	2	-	3	-	-	-	-	2	3	3
CO-3	-	-	3	3	3	-	3	-	-	-	-	-	3	3
CO-4	-	-	3	3	3	-	3	-	-	-	-	-	3	3
CO-5	-	-	-	-	-	3	3	3	2	-	-	-	-	3
UNIT– I														
Introduction to Green Building– Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing A Green Building, Important Sustainable Features for Green Buildings.														



UNIT– II		
Green Building Concepts and Practices– Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency.		
UNIT– III		
Green Building Design– Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT– IV		
Air Conditioning– Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT– V		
Material Conservation– Handling of Non-Process Waste, Waste Reduction During Construction, Materials with Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.		
TEXT BOOKS:		
1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009. 2. Green Building Hand Book by tom woolley and Sam kimings, 2009.		
REFERENCEBOOKS:		
1. Complete Guide to Green Buildings by Trish riley 2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009 3. Energy Conservation BuildingCode–ECBC-2020, published by BEE		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/102/105102195/		



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code	CONSTRUCTION TECHNOLOGY AND MANAGEMENT (OPENELECTIVE– I)				L	T	P	C						
23A101305b					3	0	0	3						
Course Objectives:														
The objectives of this course are to make the student:														
1. To understand project management fundamentals, organizational structures, and leadership principles in construction. 2. To analyze manpower planning, equipment management, and cost estimation in civil engineering projects. 3. To apply planning, scheduling, and project management techniques such as CPM and PERT. 4. To evaluate various contract types, contract formation, and legal aspects in construction management. 5. To assess safety management practices, accident prevention strategies, and quality management systems in construction.														
Course Outcomes (COs):														
Upon successful completion of the course, students will be able to:														
1. Understand project management fundamentals, organizational structures, and leadership principles in construction. 2. Analyze manpower planning, equipment management, and cost estimation in civil engineering projects. 3. Apply planning, scheduling, and project management techniques such as CPM and PERT. 4. Evaluate various contract types, contract formation, and legal aspects in construction management. 5. Assess safety management practices, accident prevention strategies, and quality management systems in construction.														
CO–POArticulationMatrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	-	-	-	-	2	-	2	2	-	-	-	3	3
CO-2	-	3	-	-	2	-	-	-	-	-	-	2	3	3
CO-3	-	-	3	3	3	-	-	-	-	2	-	-	3	3
CO-4	-	-	3	3	3	-	-	2	-	-	-	-	3	3
CO-5	-	-	-	-	-	3	3	3	2	-	-	-	-	3
UNIT– I														
Introduction: Project forms, Management Objectives and Functions; Organizational Chart of A Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership and Team - Ethics, Morale, Delegation and Accountability.														



UNIT– II		
Man and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Movers and Hauling Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.		
UNIT– III		
Planning, Scheduling and Project Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network-formulation and Time Computation.		
UNIT– IV		
Contracts: Types of Contracts, formation of Contract – Contract Conditions – Contract for Labour, Material, Design, Construction – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.		
UNIT– V		
Safety Management – Implementation and Application of QMS in Safety Programs, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas in Construction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.		
TEXT BOOKS:		
1. Construction Project Management, SK. Sears, GA. Sears, RH. Clough, JohnWiley and Sons, 6th Edition, 2016. 2. Construction Project Scheduling and Control by Saleh Mubarak, 4th Edition, 2019 3. Pandey, I.M (2021) Financial Management 12thedition. Pearson India Education Services Pvt. Ltd.		
REFERENCE BOOKS:		
1. Brien, J. O. and Plotnick, F. L., CPM in Construction Management, McGraw-Hill, 2010. 2. Punmia, B. C., and Khandelwal, K. K., Project Planning and Control with PERT and CPM, Laxmi Publications, 2002. 3. Construction Methods and Management, Pearson New International Edition, 8th Edition, by Stephens Nunnally. 4. Rhoden, M. and Cato, B., Construction Management and Organisational Behaviour, Wiley-Blackwell, 2016		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/104/105104161/https://archive.nptel.ac.in/courses/105/103/105103093/		



CIVIL ENGINEERING						
III B.Tech– I Semester						
Course Code	GEOTECHNICAL ENGINEERING				L	T
23A101303P	LAB				P	C
					0	0
					0	1.5

Course Objectives:

The objectives of this course are to make the student:

1. **Understand** the fundamental index properties of soils and their significance in geotechnical engineering.
2. **Perform** field and laboratory tests to determine in-situ density and compaction characteristics of soils.
3. **Evaluate** the engineering properties of soil, including permeability, shear strength, and consolidation.
4. **Analyze** the strength and deformation characteristics of soils through shear and compression tests.
5. **Interpret** test results and relate engineering properties of soil to real-world geotechnical problems and design considerations.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Determine** index properties of soil, including specific gravity, grain size distribution, and consistency limits.
2. **Conduct** field and laboratory compaction tests to evaluate the moisture-density relationship of soil.
3. **Evaluate** permeability and consolidation characteristics of soil using appropriate laboratory techniques.
4. **Analyze** the shear strength and compressibility of soil through direct shear, unconfined compression, and tri-axial tests.
5. **Integrate** test results and engineering judgment to interpret soil behavior and make informed decisions in geotechnical engineering applications.

CO–PO Articulation Matrix: -

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	-	-	-	-	-	2	-	2	3	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	3	2
CO-3	3	3	2	2	2	-	-	-	-	-	-	1	3	3
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-5	2	2	2	1	3	-	-	-	-	2	1	2	2	2

LIST OF EXPERIMENTS: -

1. **Determination of Index Properties**
 - a. Specific Gravity of Soil
 - b. Grain Size Distribution – Sieve Analysis
 - c. Grain Size Distribution – Hydrometer Analysis
 - d. Liquid Limit and Plastic Limit Tests
 - e. Shrinkage Limit and Differential Free Swell Tests
2. **Determination of In-Situ Density and Compaction Characteristics**
 - a. Field Density Test (Sand Replacement Method)
 - b. Determination of Moisture–Density Relationship Using Standard Proctor Compaction Test



3. Determination of Engineering Properties

- a. Permeability Determination (Constant Head Method)
- b. Permeability Determination (Falling Head Method)
- c. Determination of Coefficient of Consolidation
- d. Direct Shear Test in Cohesionless Soil
- e. Unconfined Compression Test in Cohesive Soil
- f. Laboratory Vane Shear Test in Cohesive Soil
- g. Tri-Axial Compression Test in Cohesive Soil
- h. California Bearing Ratio (CBR) Test

Note: Any 10 of the above Experiments.

TEXT BOOKS:

1. Lambe T.W., —Soil Testing for Engineers, John Wiley and Sons, New York, 1951. Digitized 2008.
2. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

REFERENCEBOOKS:

1. Saibaba Reddy, E. Ramasastri, K., “Measurement of Engineering Properties of Soils,” New Age International (P) Limited Publishers, New Delhi, 2008.
2. G. Venkatappa Rao and Goutham K. Potable, “Geosynthetics Testing – A Laboratory Manual,” Sai Master Geoenvironmental Services Pvt. Ltd., 1st Edition, 2008.
3. Braja M. Das, “Soil Mechanics: Laboratory Manual,” Oxford University Press, Eighth Edition, 2012.

Online Learning Resources:

<https://nptel.ac.in/courses/105101160>



CIVIL ENGINEERING														
III B.Tech– I Semester														
Course Code	FLUID MECHANICS				L	T	P	C						
23A101306	HYDRAULICMACHINESLAB				0	0	0	1.5						
Course Objectives: The objectives of this course are to make the student: 1. Understand the principles of fluid mechanics and validate fundamental concepts through experiments. 2. Determine discharge coefficients for various flow measurement devices and analyze flow behavior. 3. Evaluate energy losses in pipes, open channels, and hydraulic jumps to improve flow efficiency. 4. Analyze the impact of jet forces on vanes and their applications in hydraulic machinery. 5. Assess the performance characteristics of hydraulic turbines and pumps under different operating conditions.														
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Verify Bernoulli’s equation and apply it to real-life fluid flow problems. 2. Determine the coefficient of discharge for orifices, notches, and flow meters. 3. Evaluate head losses due to friction and minor losses in pipe flow systems. 4. Analyze the impact of jets on vanes and its significance in hydraulic machinery. 5. Assess the performance of turbines and pumps under different conditions and recommend optimal operating parameters.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	-	-	-	-	-	2	-	2	3	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	3	2
CO-3	3	3	2	2	2	-	-	-	-	-	-	1	3	3
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-5	2	2	2	1	3	-	-	-	-	2	1	2	2	2
List of Experiments 1. Verification of Bernoulli’s Equation 2. Determination of Coefficient of Discharge for a Small Orifice by a Constant Head Method 3. Calibration of Venturimeter / Orifice Meter 4. Calibration of Triangular / Rectangular / Trapezoidal Notch 5. Determination of Minor Losses in Pipe Flow 6. Determination of Friction Factor of a Pipeline 7. Determination of Energy Loss in Hydraulic Jump 8. Determination of Manning’s and Chezy’s Constants for Open Channel Flow.														



9. Impact of Jet on Vanes
 10. Performance Characteristics of Pelton Wheel Turbine
 11. Performance Characteristics of Francis Turbine
 12. Performance Characteristics of Kaplan Turbine
 13. Performance Characteristics of a Single Stage / Multistage Centrifugal Pump
- Note: Minimum 10 out of the above are to be conducted.**

TEXT BOOKS:

1. Desmukh T. S., A Lab Manual on Fluid Mechanics and Hydraulic Machines, Laxmi Publications.
2. Dr. S. K. Panigrahi, Ms. L. Mohanty, Fluid Mechanics and Hydraulic Machines Laboratory Manual, S. K. Kataria & Sons, Educational Publisher.

REFERENCE BOOKS:

1. Dr. N. Kumara Swamy, Fluid Mechanics and Machinery Laboratory Manual, Chartor Publications
2. D.Sathish, Fluid Mechanics and Machinery Lab Manual, BP International Publications

Online Learning Resources:

<https://archive.nptel.ac.in/courses/112/106/112106311/>



CIVIL ENGINEERING													
III B.Tech– I Semester													
Course Code	ESTIMATION, SPECIFICATIOIS, COSTING AND VALUATION				L	T	P	C					
23A101307					0	1	2	2					
Course Objectives: The objectives of this course are to make the student: 1. Understand the various methods and types of estimates used in civil engineering projects. 2. Develop detailed estimates for single and multi-storey buildings using standard estimation methods. 3. Analyze rate analysis, abstract estimation, and bill preparation as per standard procedures. 4. Prepare detailed specifications and tender documents for construction works. 5. Evaluate the valuation, cost escalation, and value analysis of buildings.													
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Apply estimation techniques to prepare detailed estimates for various construction projects. 2. Develop abstract estimates and rate analysis for different civil engineering works. 3. Analyze the preparation of measurement books and bill preparation as per AP State Government procedures. 4. Create detailed specifications and tender documents for construction projects. 5. Assess building valuation, cost escalation, and value analysis techniques.													
CO–PO Articulation Matrix: -													
Course Outcomes	PO 1	PO 2	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	1	-	-	-	-	-	1	-	2	3	2
CO-2	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-3	3	3	2	2	-	2	1	-	-	-	1	3	3
CO-4	3	3	2	2	-	2	1	-	-	-	1	3	3
CO-5	2	2	1	3	-	3	1	-	1	1	2	2	2
List of Experiments: 1. Activity based on learning methods and types of estimates. 2. Preparation of detailed estimate for a single-storied residential building using Wall to Wall Method. 3. Preparation of detailed estimate for a single-storied residential building using Centre Line Method for earthwork, foundations, super structure, fittings including sanitary and electrical fittings & paintings.													



4. Preparation of detailed estimate for a two-storied residential building using Centre Line Method for earthwork, foundations, super structure, fittings including sanitary and electrical fittings & paintings.
5. Activity-based learning of estimate data and rate analysis.
6. Preparation of abstract estimate for the detailed estimate in Exercise No. 3.
7. Preparation of abstract estimate for the detailed estimate in Exercise No. 4.
8. Writing of measurement book and bill preparation as per AP State Government procedure for detailed estimate in No. 3 and abstract estimate of No. 6.
9. Writing of detailed specifications for various items of estimate and preparing a model tender document for the work listed in No. 3 and No. 6.
10. Activity-based learning for valuation of buildings, cost escalation procedures, and value analysis for any one work.

TEXT BOOKS:

1. B. N. Dutta – Estimating and Costing in Civil Engineering, CBS Publishers & Distributors, 28th Revised Edition (2020).
2. Rangwala – Estimating, Costing and Valuation, Charotar Publishing House, 2023.
3. D. D. Kohli & R. C. Kohli – A Textbook of Estimating and Costing (Civil), S. Chand Publishing, 2011.

REFERENCE BOOKS:

1. M. Chakraborti - Estimating, Costing, Specification & Valuation in Civil Engineering, 29th Edition (2021).
2. Gurcharan Singh-Estimating, Costing and Valuation, Standard Publishers, 2018.
3. V.N. Vazirani & S.P. Chandola - Civil Engineering Estimating & Costing, Khanna Publishers, 4th Edition (2001).

Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview
<http://www.coursera.org/learn/construction-cost-estimating>



III B.Tech – I semester

23A104306P	TINKERING LAB	L	T	P	C
		2	0	0	1

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course objectives: The objectives of the course are to	
1	Encourage Innovation and Creativity
2	Provide Hands-on Learning and Impart Skill Development
3	Foster Collaboration and Teamwork
4	Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5	Impart Problem-Solving mind-set

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

- 1) Make your own parallel and series circuits using breadboard for any application of your choice.
- 2) Design and 3D print a Walking Robot
- 3) Design and 3D Print a Rocket.
- 4) Temperature & Humidity Monitoring System (DHT11 + LCD)
- 5) Water Level Detection and Alert System
- 6) Automatic Plant Watering System
- 7) Bluetooth-Based Door Lock System
- 8) Smart Dustbin Using Ultrasonic Sensor
- 9) Fire Detection and Alarm System
- 10) RFID-Based Attendance System
- 11) Voice-Controlled Devices via Google Assistant
- 12) Heart Rate Monitoring Using Pulse Sensor
- 13) Soil Moisture-Based Irrigation
- 14) Smart Helmet for Accident Detection
- 15) Milk Adulteration Detection System
- 16) Water Purification via Activated Carbon
- 17) Solar Dehydrator for Food Drying
- 18) Temperature-Controlled Chemical Reactor
- 19) Ethanol Mini-Plant Using Biomass
- 20) Smart Fluid Flow Control (Solenoid + pH Sensor)
- 21) Portable Water Quality Tester
- 22) AI Crop Disease Detection
- 23) AI-based Smart Irrigation
- 24) ECG Signal Acquisition and Plotting
- 25) AI-Powered Traffic Flow Prediction
- 26) Smart Grid Simulation with Load Monitoring
- 27) Smart Campus Indoor Navigator
- 28) Weather Station Prototype
- 29) Firefighting Robot with Sensor Guidance



- 30) Facial Recognition Dustbin
- 31) Barcode-Based Lab Inventory System
- 32) Growth Chamber for Plants
- 33) Biomedical Waste Alert System
- 34) Soil Classification with AI
- 35) Smart Railway Gate
- 36) Smart Bin Locator via GPS and Load Sensors
- 37) Algae-Based Water Purifier
- 38) Contactless Attendance via Face Recognition

- **Note:** The students can also design and implement their own ideas, apart from the list of experiments mentioned above.
- **Note:** A minimum of 8 to 10 experiments must be completed by the students.



23A104320	INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS (Qualitative Treatment)	L	T	P	C
		3	0	0	3

Course Objectives (COBJ):

- Introduce fundamental quantum concepts like superposition and entanglement.
- Understand theoretical structure of qubits and quantum information.
- Explore conceptual challenges in building quantum computers.
- Explain principles of quantum communication and computing.
- Examine real-world applications and the future of quantum technologies.

Course Outcomes (CO):

- Explain core quantum principles in a non-mathematical manner.
- Compare classical and quantum information systems.
- Identify theoretical issues in building quantum computers.
- Discuss quantum communication and computing concepts.
- Recognize applications, industry trends, and career paths in quantum technology.

Unit 1: Introduction to Quantum Theory and Technologies

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China

Unit 2: Theoretical Structure of Quantum Information Systems

What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view), Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role

Unit 3: Building a Quantum Computer – Theoretical Challenges and Requirements

What is required to build a quantum computer (conceptual overview)? Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers: Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison), Superconducting circuits, trapped ions, Photonics, Vision vs reality: what's working and what remains elusive, the role of quantum software in managing theoretical complexities

Unit 4: Quantum Communication and Computing – Theoretical Perspective

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD), Role of Entanglement in Communication, The Idea of the Quantum



Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once), Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

Unit 5: Applications, Use Cases, and the Quantum Future

Real-world application domains: Healthcare (drug discovery), Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, PsiQuantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race

Textbooks:

1. Michael A. Nielsen, Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
3. Chris Bernhardt, *Quantum Computing for Everyone*, MIT Press, 2019.

Reference Books:

1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, *An Introduction to Quantum Computing*, Oxford University Press, 2007.
3. Scott Aaronson, *Quantum Computing Since Democritus*, Cambridge University Press, 2013.
4. **Alastair I.M. Rae**, *Quantum Physics: A Beginner's Guide*, Oneworld Publications, Revised Edition, 2005.
5. **Eleanor G. Rieffel, Wolfgang H. Polak**, *Quantum Computing: A Gentle Introduction*, MIT Press, 2011.
6. **Leonard Susskind, Art Friedman**, *Quantum Mechanics: The Theoretical Minimum*, Basic Books, 2014.
7. **Bruce Rosenblum, Fred Kuttner**, *Quantum Enigma: Physics Encounters Consciousness*, Oxford University Press, 2nd Edition, 2011.
8. **Giuliano Benenti, Giulio Casati, Giuliano Strini**, *Principles of Quantum Computation and Information, Volume I: Basic Concepts*, World Scientific Publishing, 2004.
9. **K.B. Whaley et al.**, *Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document*, Quantum Flagship, European Commission, 2020.
10. **Department of Science & Technology (DST), Government of India**, *National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers*, MeitY/DST Publications, 2020 onward.

Online Learning Resources:

- [IBM Quantum Experience and Qiskit Tutorials](#)
- [Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley](#)
- [edX – The Quantum Internet and Quantum Computers](#)
- [YouTube – Quantum Computing for the Determined by Michael Nielsen](#)
- Qiskit Textbook – IBM Quantum



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		DESIGN OF STEEL STRUCTURES								L	T	P	C	
23A101308										3	0	0	3	
Course Objectives: The objectives of this course are to make the student: 1. Understand the properties, types, and applications of structural steel in construction. 2. Analyze the behavior and design of bolted and welded connections for steel structures. 3. Design tension and compression members, including built-up members and column bases. 4. Develop steel structural elements such as beams, plate girders, roof trusses, and gantry girders. 5. Apply plastic analysis concepts to the design of continuous beams and portal frames.														
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Explain the properties of structural steel, types of sections, and the concept of limit state design. 2. Analyze and design bolted and welded connections for structural steel members. 3. Design tension and compression members, including built-up sections and column bases. 4. Develop design solutions for beams, plate girders, roof trusses, and gantry girders. 5. Perform plastic analysis and design of continuous beams and portal frames.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	1	1	1	-	1	-	2	2	2	2
CO-2	3	2	2	2	1	1	1	-	1	-	2	2	1	1
CO-3	3	2	2	2	1	-	-	-	1	-	2	2	2	1
CO-4	3	2	2	2	1	-	-	-	1	-	2	2	1	1
CO-5	3	2	2	2	1	-	-	-	1	-	2	2	2	2
UNIT– I														
INTRODUCTION to STRUCTURAL STEEL and DESIGN of CONNECTIONS General -Types of Steel -Properties of Structural Steel - I.S. Rolled Sections - Concept of Limit State Design-Design of Simple and Eccentric Bolted and Welded Connections-Types of Failure and Efficiency of Joint – Prying Action - Introduction to HSFG bolts														
UNIT– II														
DESIGN of TENSION and COMPRESSION MEMBERS Behaviour and Design of Simple and Built-Up Members Subjected to Tension - Shear Lag Effect Design of Lug Angles - Tension Splice - Behaviour of Short and Long Columns - Euler's Column Theory Design of Simple and Built-Up Compression Members with Lacing and Battens - Design of Column Bases - Slab Base and Gusseted Base														
UNIT– III														
DESIGN of BEAMS Design of Laterally Supported and Unsupported Beams - Design of Built-Up Beams - Design of Plate Girders														
UNIT– IV														
INDUSTRIAL STRUCTURES Design of Roof Trusses–Loads on Trusses–Purlin Design Using Angle and Channel														



Sections–Truss Design, Design of Joints and End Bearings–Design of Gantry Girder-
Introduction to Pre-Engineered Buildings

UNIT– V**PLASTIC ANALYSIS and DESIGN**

Introduction to Plastic Analysis - Theory of Plastic Analysis - Design of Continuous Beams and Portal Frames Using Plastic Design Approach.

TEXT BOOKS:

1. Duggal S. K., Design of Steel Structures, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2010.
2. Bhavikatti S. S., Design of Steel Structures, IK International Publishing House, New Delhi, 2017.

REFERENCEBOOKS:

1. Gambhir M. L., Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt. Limited, 2013.
2. Jack C. McCormac & Stephen F. Csernak, Structural Steel Design, Pearson, 7th Edition, 2023.
3. William T. Segui & Farid Soleimani, Steel Design, Cengage, 7th Edition, 2023.
4. Sarwar Alam Raz, Structural Design in Steel, New Age International Publishers, 2014.
5. Subramanian N., Design of Steel Structures, Oxford University Press, New Delhi, 2016.

Online Learning Resources:

<https://nptel.ac.in/courses/105105162>



CIVIL ENGINEERING														
III B.Tech– II Semester														
CourseCode						HIGHWAY				L	T	P	C	
23A101309T						ENGINEERING				3	0	0	3	
Course Objectives: The objectives of this course are to make the student: 1. Understand the history, importance, and planning aspects of highway development in India. 2. Apply geometric design principles for highway alignment, sight distance, and curves. 3. Analyze traffic characteristics, capacity, level of service, and road safety measures. 4. Design flexible and rigid pavements using IRC guidelines. 5. Evaluate highway construction materials, testing methods, and maintenance techniques.														
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Explain the significance, planning, and alignment of highways. 2. Design geometric elements of highways, including curves, gradients, and sight distances. 3. Analyze traffic flow, capacity, level of service, and implement road safety measures. 4. Design flexible and rigid pavements as per IRC guidelines. 5. Assess construction practices, highway materials, and pavement maintenance techniques.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	-	-	-	-	-	1	-	2	3	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO-3	3	3	3	2	2	-	2	1	-	-	-	1	3	3
CO-4	3	3	3	2	2	-	2	1	-	-	-	1	3	3
CO-5	2	2	2	1	3	-	3	1	-	1	1	2	2	2
UNIT– I														
PLANNED HIGHWAY DEVELOPMENT IN INDIA: Highway development in India – Necessity for highway planning – Different Road development plans – Classification of roads – Road network patterns – Highway alignment – Factors affecting alignment – Engineering surveys – Drawings and reports.														
UNIT– II														
GEOMETRIC DESIGN of HIGHWAYS Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves - Design of Vertical Alignment – Gradients - Vertical curves.														
UNIT– III														
TRAFFIC ENGINEERING STUDIES Basic Parameters of Traffic-Volume, Speed and Density– Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service -Traffic Volume Studies- Data Collection and Presentation - Speed studies - Data Collection and Presentation —Road Accidents-Causes and Preventive Measures - Accident Data Recording – Condition Diagram and Collision Diagrams.														



UNIT– IV		
INTERSECTION DESIGN Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade-Separated Intersections - Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersections.		
UNIT– V		
PAVEMENT DESIGN Types of Pavements – Difference Between Flexible and Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base and Wearing Course – Functions of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002) –Design of Rigid Pavements – Critical Load Positions - Westergaard_S Stress Equations – Computing Radius of Relative Stiffness and Equivalent Radius of Resisting Section – Stresses in Rigid Pavements – Design of Expansion and Contraction Joints in CC Pavements. Design of Dowel Bars and Tie Bars.		
TEXT BOOKS:		
1. Highway Engineering – S. K. Khanna & C. E. G. Justo, Nem Chand & Bros., 9th Edition (2011). 2. Transportation Engineering, Volume I – C. Venkatramaiah, Universities Press, 2015.		
REFERENCEBOOKS:		
1. Principles of Highway Engineering – L. R. Kadiyali, Khanna Publishers. 2. Traffic Engineering and Transportation Planning – L. R. Kadiyali and Lal, Khanna Publications, 9th Edition. 3. Highway Engineering – Dr. S. K. Sharma, S. Chand Publishers, 2014 Edition.		
Online Learning Resources:		
https://nptel.ac.in/courses/105101087		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		ENVIRONMENTAL ENGINEERING								L	T	P	C	
23A101310T										3	0	0	3	
Course Objectives: The objectives of this course are to make the student: 1. Understand the sources, demand estimation, and quality parameters of water. 2. Apply water treatment processes for purification and supply. 3. Analyze storage, distribution, and operation of water supply systems. 4. Design sewerage systems, stormwater drainage, and plumbing networks. 5. Evaluate sewage treatment, sludge management, and water reuse methods.														
Course Outcomes: Upon successful completion of this course, students will be able to: 1. Explain water sources, quality standards, and waterborne diseases. 2. Design unit processes of water treatment plants. 3. Analyze water distribution networks and pumping stations. 4. Design sewerage systems, including stormwater and sanitary sewers. 5. Assess sewage treatment methods and advanced wastewater management techniques.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	-	3	3	1	-	1	-	2	3	3
CO-2	3	3	3	2	2	2	2	1	-	-	-	1	3	3
CO-3	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-4	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-5	2	2	2	1	3	3	3	1	-	1	1	2	2	2
UNIT– I														
WATER SUPPLY Estimation of Surface and Subsurface Water Resources – Predicting demand for water – Impurities of water and their significance – Physical, chemical, and bacteriological analysis – Water borne diseases – Standards for potable water. Intake of Water: Pumping and gravity schemes.														
UNIT– II														
WATER TREATMENT Objectives - Unit Operations and Processes - Principles, Functions, and Design of Water Treatment Plant Units, Aerators of Flash Mixers, Coagulation and Flocculation – Clarifloccuator- Plate and Tube Settlers – Pulsator Clarifier - Sand Filters - Disinfection - Softening, Removal of Iron and Manganese - Defluoridation- Softening - Desalination Process - Residue Management - Construction, Operation and Maintenance Aspects														
UNIT– III														
WATER STORAGE and DISTRIBUTION Storage and Balancing Reservoirs - Types, Location and Capacity. Distribution System: Layout, Hydraulics of Pipe Lines, Pipe Fittings, Valves Including Check and Pressure Reducing Valves, Meters, Analysis of Distribution Systems, Leak Detection, Maintenance of Distribution Systems, Pumping Stations and Their Operations –House Service Connections.														



UNIT– IV		
PLANNING and DESIGN of THE SEWERAGE SYSTEM Characteristics and Composition of Sewage - Population Equivalent - Sanitary Sewage Flow Estimation - Sewer Materials - Hydraulics of Flow in Sanitary Sewers - Sewer Design - Storm Drainage-Storm Runoff Estimation - Sewer Appurtenances - Corrosion in Sewers - Prevention and Control – Sewage Pumping-Drainage in Buildings - Plumbing Systems for Drainage.		
UNIT– V		
SEWAGE TREATMENT and DISPOSAL Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended Aeration Systems-Trickling Filters- Sequencing Batch Reactor (SBR) - UASB - Waste Stabilization Ponds - Other Treatment Methods - Reclamation and Reuse of Sewage-Recent Advances in Sewage Treatment -Construction, Operation and Maintenance Aspects. - Discharge Standards-Sludge Treatment -Disposal of Sludge.		
TEXT BOOKS:		
1. Environmental Engineering by H. S. Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt. Ltd., 2014. 2. Environmental Engineering – I and II by B. C. Punmia, Standard Publications.		
REFERENCEBOOKS:		
1. Environmental Engineering – I and II by S. K. Garg, Khanna Publications. 2. Environmental Pollution and Control Engineering by C. S. Rao, Wiley Publications. 3. Wastewater Engineering by Metcalf and Eddy, McGraw Hill, 2015. 4. Environmental Engineering by D. P. Sincero and G. A. Sincero, Pearson, 2015. 5. Water and Waste Water Technology by Mark J. Hammer and Mark J. Hammer Jr., Wiley, 2007.		
Online Learning Resources:		
https://nptel.ac.in/courses/103107084		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		DESIGN OF EARTHQUAKE RESISTANT STRUCTURES (PE- II)								L	T	P	C	
23A101311a										3	0	0	3	
Course Objectives: The objectives of this course are to make the student: 1. Understand the fundamental concepts of engineering seismology, including earthquake phenomena, seismic waves, and measuring instruments. 2. Analyze the principles of structural vibrations, degrees of freedom, and dynamic response of structures to earthquake ground motions. 3. Evaluate conceptual design strategies, seismic design principles, and methods for improving earthquake resistance in structures. 4. Apply earthquake-resistant design principles to reinforced concrete and masonry buildings using IS codes and lateral force methods. 5. Assess the role of structural walls, non-structural elements, and ductility considerations in enhancing earthquake resistance.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain earthquake mechanisms, seismic waves, and seismic zones, including measuring techniques and instruments. 2. Analyze vibratory systems, single-degree-of-freedom (SDOF) models, damping effects and earthquake-induced dynamic forces. 3. Evaluate conceptual design strategies, ductility factors, and seismic design methods for ensuring structural resilience. 4. Apply IS code provisions and lateral force methods for seismic design of reinforced concrete and masonry buildings. 5. Assess the significance of structural walls, non-structural elements, and ductile detailing in enhancing earthquake resistance.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14
CO-1	3	2	-	-	1	-	3	1	-	2	-	2	2	2
CO-2	3	-	-	-	2	-	3	1	-	2	-	-	-	2
CO-3	3	-	-	3	-	-	3	2	-	2	-	-	-	3
CO-4	3	2	-	3	-	-	3	2	-	2	2	2	3	3
CO-5	3	3	-	3	-	-	3	2	-	2	2	2	3	3
UNIT– I														
Engineering Seismology: Earthquake Phenomenon - Cause of Earthquakes-Faults- Plate Tectonics- Seismic Waves- Terms Associated with Earthquakes-Magnitude/Intensity of An Earthquake-Scales- Energy Released-Earthquake Measuring Instruments Seismogram - Seismoscope, Seismograph, - Strong Ground Motions- Seismic Zones of India. Theory of Vibrations: Elements of A Vibratory System- Degrees of Freedom-Continuous System- Lumped Mass Idealization-Oscillatory Motion-Simple Harmonic Motion-Free Vibration of Single Degree of Freedom (SDOF) System- Undamped and Damped-Critical Damping-Logarithmic Decrement-Forced Vibrations-Harmonic Excitation-Dynamic Magnification Factor-Excitation by Rigid Based Translation for SDOF System-Earthquake Ground Motion.														



UNIT– II		
Conceptual Design: Introduction-Functional Planning-Continuous Load Path-Overall form-Simplicity and Symmetry-Elongated Shapes-Stiffness and Strength-Horizontal and Vertical Members-Twisting of Buildings-Ductility-Ductility Relationships-Flexible Buildings-Framing Systems-Choice of Construction Materials-Unconfined Concrete-Confined Concrete-Masonry-Reinforcing Steel. Introduction to Earthquake Resistant Design: Seismic Design Requirements-Regular and Irregular Configurations-Basic Assumptions-Design Earthquake Loads-Basic Load Combinations-Permissible Stresses-Seismic Methods of Analysis-Factors in Seismic Analysis-Equivalent Lateral force Method.		
UNIT– III		
Reinforced Concrete Buildings: Principles of Earthquake Resistant Design of RC Members-Structural Models for Frame Buildings - Seismic Methods of Analysis- Is Code Based Methods for Seismic Design - Vertical Irregularities - Plan Configuration Problems- Lateral Load Resisting Systems-Determination of Design Lateral forces as Per Is1893 (Part-1);2016-Equivalent Lateral force Procedure- Lateral Distribution of Base Shear.		
UNIT– IV		
Masonry Buildings: Introduction- Elastic Properties of Masonry Assemblage- Categories of Masonry Buildings- Behaviour of Unreinforced and Reinforced Masonry Walls- Behavior of Walls- Box Action and Bands- Behaviour of Infill Walls- Improving Seismic Behaviour of Masonry Buildings-Load Combination and Permissible Stresses-Seismic Design Requirements-Lateral Load Analysis of Masonry Buildings.		
UNIT– V		
Structural Walls and Non-Structural Elements: Strategies in The Location of Structural Walls- Sectional Shapes- Variations in Elevation- Cantilever Walls Without Openings – Failure Mechanism of Non-Structures- Effects of Non-Structural Elements On Structural System- Analysis of Non-Structural Elements- Prevention of Non-Structural Damage Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors Affecting Ductility-Ductile Detailing Considerations as Per Is 13920-2016-Behaviour of Beams, Columns and Joints in RC Buildings During Earthquakes		
TEXT BOOKS:		
1. Earthquake Resistant Design of Structures – S.K. Duggal, Oxford University Press 2. Earthquake Resistant Design of Structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd..		
REFERENCEBOOKS:		
1. Seismic Design of Reinforced Concrete and Masonry Buildings – T. Paulay and M.J.N. Priestly, John Wiley & Sons 2. Earthquake Resistant Design of Building Structures – Vinod Hosur, Wiley India Pvt. Ltd. 3. Elements of Mechanical Vibration – R.N. Iyengar, I.K. International Publishing House Pvt. Ltd. 4. Masonry and Timber Structures Including Earthquake Resistant Design – Anand S. Arya, Nem Chand & Bros 5. Earthquake Tips – Learning Earthquake Design and Construction – C.V.R. Murthy 6. BIS Codes: IS 1893 (Part-1): 2016 or latest IS 13920: 2016 IS 4326 IS 456: 2000 or latest		
Online Learning Resources:		
https://nptel.ac.in/courses/105107204		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		OPEN CHANNEL FLOW								L	T	P	C	
23A101311b		(PE–II)								3	0	0	3	
Course Objectives (COs):														
The objectives of this course are to make the student to:														
1. Explain the principles governing fluid flow in pipelines and networks, including steady and unsteady flow conditions. 2. Apply fundamental concepts of uniform and varied flow in open channels for analyzing hydraulic structures and networks. 3. Analyze the behavior of unsteady flows in open channels, including wave motion and dam break scenarios. 4. Evaluate sediment transport mechanisms and their impact on hydraulic structures, reservoirs, and river morphology. 5. Design and assess hydraulic models, flow measurement devices, and physical models for hydraulic applications.														
Course Outcomes (COs):														
After successful completion of this course, students will be able to:														
1. Describe the fundamental principles of fluid flow in pipelines and networks under steady and unsteady conditions. 2. Solve problems related to uniform and varied flow in open channels using theoretical and computational approaches. 3. Analyze the impact of unsteady flow phenomena such as surges and dam breaks in open channels. 4. Evaluate sediment transport processes and their influence on river morphology and hydraulic structures. 5. Develop and validate hydraulic models for flow measurement and physical modeling applications in fluid mechanics.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO-2	3	2	2	1	2	-	-	-	-	-	-	-	2	1
CO-3	2	3	2	2	2	-	-	-	-	-	-	-	3	2
CO-4	2	3	3	3	2	-	-	-	-	-	-	-	3	3
CO-5	2	2	3	3	3	2	-	-	-	-	-	-	3	3
UNIT– I														
HYDRAULICS of PIPE LINES and PIPE NETWORKS														
Review of Fluid Mechanics. Reynolds Transport Theorem and Applications. Steady Flow Analysis of Pipe Network Systems. Unsteady Flows - Basic Equations of Water Hammer, Solution by Method of Characteristics. Network Analysis														
UNIT– II														
STEADY VARIED FLOWS in OPEN CHANNELS														
Basic Concepts of Uniform Flow. Specific Energy and Specific force Concepts. Dynamic Equation for Spatially Varied Flows. Flow Profile Computations. IntroductiontoHec-Ras. Spatially Varied Flows and Rapidly Varied Flows – Applications.														



UNIT– III		
UNSTEADY FLOWS in OPEN CHANNELS Equations of Motion. Uniformly Progressive Wave. Rapidly Varied Unsteady Flow –Positive and Negative Surges. Dam Break Problem		
UNIT– IV		
SEDIMENT TRANSPORT Sediment Properties–Inception of Sediment Motion–Bedforms. Bed Load Suspended Load – total Sediment Transport. Design of Stable Channels and Regime Channels. Reservoir Sedimentation and Trap Efficiency.		
UNIT– V		
FLOW MEASUREMENT and HYDRAULIC MODELING Sharp-Crested Weirs, Broad-Crested Weirs, Critical Depth Flumes. Recent Advancement in Open Channel Flow Measurements. Physical Modeling in Hydraulics. Dimensional Analysis. Modeling Closed Flows and Free Surface Flows. Distorted Models. Design of Physical Models.		
TEXT BOOKS:		
1. Flow in Open Channels by Subramanya K., Tata McGraw Hill Publications, New Delhi, 2015. 2. Flow through Open Channels by Rajesh Srivastava, Oxford University Press, New Delhi, 2011. 3. Open Channel Hydraulics by Chow, V.T., McGraw Hill Inc., New York, 1979.		
REFERENCEBOOKS:		
1. Open Channel Hydraulics by French, R.H., McGraw Hill Publishing Co., New York, 1986. 2. Open Channel Hydraulics by Terry Sturm, Tata McGraw Hill Publications, New Delhi, 2011.		
Online Learning Resources:		
https://nptel.ac.in/courses/105/106/105106114/		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code						FOUNDATION				L	T	P	C	
23A101311c						ENGINEERING (PE – II)				3	0	0	3	
Course Objectives:														
The objectives of this course are to make the student:														
1. Understand the need for soil exploration and various methods used in site investigations.														
2. Analyze the stability of slopes under different conditions using various stability methods.														
3. Apply earth pressure theories to analyze retaining walls and soil pressures.														
4. Evaluate the bearing capacity and settlement characteristics of shallow foundations.														
5. Assess the load-carrying capacity and settlement of deep foundations, including pile and well foundations.														
Course Outcomes (COs):														
After successful completion of this course, students will be able to:														
1. Explain the principles of soil exploration, field testing, and soil investigation reporting.														
2. Analyze slope stability using different failure theories and numerical methods.														
3. Apply earth pressure theories to determine the stability of retaining walls.														
4. Evaluate the bearing capacity and settlement of shallow foundations using theoretical and field methods.														
5. Analyze deep foundations, including pile and well foundations, for their load-carrying capacity and settlement.														
CO–POArticulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	2	1	1	-	-	1	-	-	-	1	-	1	1	1
CO-2	2	2	1	1	2	-	-	-	-	-	-	1	1	1
CO-3	2	2	3	2	2	-	1	-	-	-	-	1	2	2
CO-4	2	1	2	2	3	1	-	-	-	-	-	1	2	1
CO-5	2	2	2	1	2	1	-	-	-	-	-	1	2	1
UNIT– I														
SOIL EXPLORATION: Need – Methods of Soil Exploration – Boring and Sampling Methods – Field Tests – Penetration Tests – Plate Load Test – Pressure Meter – Planning of Programme and Preparation of Soil Investigation Report.														
UNIT– II														
SHALLOW FOUNDATIONS: Types – Choice of Foundation – Location of Depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff `s and Skempton`s Methods														
ALLOWABLE BEARING PRESSURE: Safe Bearing Pressure Based On N-Value– Allowable Bearing Pressure; Safe Bearing Capacity and Settlement from Plate Load Test– Allowable Settlements of Structures–Settlement Analysis.														



UNIT– III		
PILE FOUNDATION: Types of Piles – Load Carrying Capacity of Piles Based on Static Pile formulae – Dynamic Pile formulae – Pile Load Tests – Load Carrying Capacity of Pile Groups in Sands and Clays – Settlement of Pile Groups WELL FOUNDATIONS: Types – Different Shapes of Wells – Components of Wells – Functions and Design Criteria – Sinking of Wells – Tilts and Shifts		
UNIT– IV		
EARTH SLOPE STABILITY: Infinite and Finite Earth Slopes –Types of Failures –Factor of Safety of Infinite Slopes – Stability Analysis by Swedish Arc Method, Standard Method of Slices, Bishop ‘s Simplified Method–Taylor ‘s Stability Number–Stability of Slopes of Earth Dams Under Different Conditions.		
UNIT– V		
EARTH PRESSURE THEORIES: Rankine’s Theory of Earth Pressure – Earth Pressures in Layered Soils – Coulomb’s Earth Pressure Theory – Rebhann ‘s and Cullman’s Graphical Method RETAINING WALLS: Types of Retaining Walls– Stability of Retaining Walls		
TEXT BOOKS:		
1. Geotechnical Engineering by C. Venkataramaiah, New Age Publications (2002). 2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi, 7th edition, 2009. 3. Soil Mechanics and Foundations by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi, 17th edition, 2017.		
REFERENCEBOOKS:		
1. Soil Mechanics and Foundation Engineering by Purushottam Raj, Pearson Publications, 2nd edition, 2013. 2. Principles of Foundation Engineering by Das, B.M., 6th edition (Indian Edition), Thomson Engineering, 1999. 3. Foundation Engineering by Varghese, P.C., Prentice Hall of India, New Delhi. 4. Foundation Engineering by V.N.S. Murthy, CRC Press, New Delhi.		
Online Learning Resources:		
https://nptel.ac.in/courses/105105176		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		COST EFFECTIVE HOUSINGTECHNIQUES (PE – III)								L	T	P	C	
23A101312a										3	0	0	3	
Course Objectives (COs): The objectives of this course are to make the student to: 1. Analyze the housing scenario in urban and rural areas, including challenges in housing finance and urban planning. 2. Explore and evaluate innovative low-cost housing technologies for sustainable construction. 3. Investigate alternative building materials and infrastructure services for cost-effective housing solutions. 4. Assess rural housing techniques, including traditional mud housing, soil stabilization, and fire treatment for roofing. 5. Develop strategies for housing in disaster-prone areas, with a focus on earthquake, cyclone, and flood-resistant construction.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Examine the current status of urban and rural housing and analyze the role of finance and planning in housing development. 2. Evaluate and recommend cost-effective construction techniques, including prefabrication and innovative roofing/flooring systems. 3. Assess the feasibility of alternative building materials and infrastructure solutions for low-cost housing. 4. Analyze traditional rural housing methods and propose modern techniques for improving rural housing quality. 5. Design housing solutions for disaster-prone areas by incorporating earthquake, cyclone, and flood-resistant strategies.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	1	2	-	2	2	-	-	1	-	1	2	2
CO-2	3	3	2	3	2	-	3	-	-	-	-	2	3	2
CO-3	3	2	3	3	2	-	3	-	-	-	-	2	3	3
CO-4	2	3	3	3	2	2	2	-	-	-	-	2	3	3
CO-5	2	3	3	3	3	3	3	-	-	-	-	2	3	3
UNIT– I														
a) Housing Scenario: Introduction – Status of Urban Housing – Status of Rural Housing b) Housing Finance: Introduction – Existing Finance System in India – Government Role as Facilitator – Status of Rural Housing Finance – Impediments in Housing Finance and Related Issues c) Land Use and Physical Planning for Housing: Introduction – Planning of Urban Land – Urban Land Ceiling and Regulation Act – Efficiency of Building Bye-Laws – Residential Densities d) Housing the Urban Poor: Introduction – Living Conditions in Slums – Approaches and Strategies for Housing Urban Poor														



UNIT– II		
Development and adoption of low-cost Resilient housing technology Introduction - Adoption of Innovative Cost-Effective Construction Techniques - Adoption of Precast Elements in Partial Prefabrication- Adopting of total Prefabrication of Mass Housing in India- General Remarks on Pre-Cast Roofing/Flooring Systems -Economical Wall System - Single Brick Thick Load Bearing Wall - 19cm Thick Load Bearing Masonry Walls- Half Brick Thick Load Bearing Wall–Fly-Ash Gypsum Thick for Masonry - Stone Block Masonry- Adoption of Precast R.C. Plank and Join System for Roof/Floor in The Building		
UNIT– III		
Alternative Building Materials for Low-Cost Housing Introduction-Substitute for Scarce Materials–Ferro-Cement-Gypsum Boards-Timber Substitutions - Industrial Wastes - Agricultural Wastes - Alternative Building Maintenance Low-Cost Infrastructure Services: Introduction-Present Status-Technological Options-Low-Cost Sanitation-Domestic Wall -Water Supply, Energy		
UNIT– IV		
Rural Housing: Introduction Traditional Practice of Rural Housing Continuous - Mud Housing Technology Mud Roofs - Characteristics of Mud - Fire Treatment for Thatch Roof - Soil Stabilization - Rural Housing Program		
UNIT– V		
Housing in Disaster prone areas: Introduction – Earthquake - Damages to Houses - Traditional Prone Areas - Type of Damages and Repairs of Non-Engineered Buildings - Repair and Restore Action of Earthquake Damaged Non-Engineered Buildings Recommendations for Future Constructions. Requirement 'sOf Structural Safety of Thin Precast Roofing Units Against Earthquake Forces Status of R&D in Earthquake Strengthening Measures - Floods, Cyclone, Future Safety.		
TEXT BOOKS:		
1. Building Materials for Low–Income Houses – International Council for Building Research Studies and Documentation. 2. Handbook of Low-Cost Housing by A.K. Lal – New Age International Publishers. 3. Low-Cost Housing – G.C. Mathur, South Asia Books.		
REFERENCEBOOKS:		
1. Properties of Concrete – Neville A.M., Pitman Publishing Limited, London. 2. Lightweight Concrete, Academic Kiado, Rudhai G. – Publishing Home of Hungarian Academy of Sciences, 1963. 3. Modern Trends in Housing in Developing Countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G. Annamalai, E. & F. N. Spon Publishers.		
Online Learning Resources:		
https://nptel.ac.in/courses/124107001		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code	WATERSHED				L	T	P	C						
23A101312b	MANAGEMENT (PE – III)				3	0	0	3						
Course Objectives: The objectives of this course are to make the student to: 1. Understand the concept of watershed management, stakeholder roles, pollution sources, and environmental guidelines for water quality. 2. Analyze soil erosion processes, sediment yield, and wetland hydrology, including the role of water in wetland ecosystems. 3. Evaluate surface water and groundwater interactions, wetland water quality, and hydrological models for effective watershed planning. 4. Apply principles of wetland hydrologic assessment, water harvesting, and watershed treatment system design to real-world scenarios. 5. Assess irrigation planning, participatory water management, and water footprint concepts to ensure sustainable water resource utilization.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain watershed management concepts, pollution control strategies, and environmental policies related to water quality. 2. Analyze erosion processes, wetland water budgets, and sediment transport models to assess land degradation and conservation needs. 3. Evaluate surface and groundwater interactions, wetland treatment efficiency, and hydrological models for integrated water resource management. 4. Apply water harvesting techniques, hydrologic modeling, and wetland design methods for sustainable watershed management. 5. Assess irrigation water management strategies, drought mitigation policies, and the role of water footprint in agricultural sustainability.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	1	2	3	1	-	2	-	2	2	2
CO-2	3	3	2	3	2	2	3	1	-	2	-	2	2	2
CO-3	3	3	3	3	3	2	3	2	-	2	-	2	3	3
CO-4	3	2	3	3	3	3	3	2	-	2	2	2	3	3
CO-5	3	3	3	3	3	3	3	2	-	2	2	2	3	3
UNIT– I														
Concept of Watershed, Introduction to Watershed Management, Different Stakeholders and Their Relative Importance, Watershed Management Policies and Decision Making, Watershed Management Practices in Arid and Semi-arid Regions, Short-Term and Long-Term Strategic Planning, Types and Sources of Pollution, Environmental Guidelines for Water Quality, Perspective on Recycle and Reuse.														



UNIT– II		
Morphometry, Soil Erosion - Erosion - Factors Affecting Erosion, Effects of Erosion on Land Fertility and Land Capability, Soil Erosion Modelling, Erosivity and Erodibility - Sediment Yield and Sedimentation- Wetland Definitions and The Role of Water in Wetland Structure and Function, Introduction to Wetland Water Budgets and Hydro-Period Components of The Water Budget: Inflows, Outflows, and Storage, Precipitation and Runoff, Evapo transpiration;		
UNIT– III		
Surface Water Flows: Structures and Channels, Groundwater-Surface Water Exchange inWetlands, Surface Water Flows and Wetland Hydrology Case Studies, Flow and Mixing inWetlands Wetland Water Quality Information: Nutrients, Organic/Inorganic Contaminants, Sediments and Colloids, Wetland Transport Models: Plug Flow, Cstrs and Cstrs inSeries; Intro to Method of Moments.		
UNIT– IV		
Wetland Hydrologic Assessment: Physical and Biological Processes, Anthropogenic and Climate Change Impacts on Wetland Hydrology, Modeling Wetland Hydrology, Hydraulics, and Hydrodynamics, Introduction to Wetland Treatment Systems Design- Water Harvesting: Rainwater Harvesting, Catchment Harvesting, Harvesting Structures - Model Watershed – Government and Ngo Projects.		
UNIT– V		
Rain Water Management. Planning and Operation of Irrigation Systems. Conjunctive Use of Water. Participatory Irrigation Management and Integrated Water Resources Management (IWRM), Water Management Policy During Droughts. Predicting Effect of Water Shortage on Crops. Introduction to Water Footprint of Crops and Its Applications. Blue, Green and Grey Water Foot Print.		
TEXT BOOKS:		
1. T. O. Randhir, Watershed Management: Issues and Approaches, IWA Publishing, 2006 2. J. V. S. Murty, Watershed Management, New Age International, 2013		
REFERENCEBOOKS:		
1. D. K. Majumdar, Irrigation Water Management, Prentice Hall, 2014 2. K. N. Brooks, P. F. Folliott, J. A. Magner, Hydrology and the Management of Watersheds, Wiley-Blackwell, Fourth Edition, 2012 3. E. M. Tideman, Watershed Management: Guidelines for Indian Conditions, Omega Scientific Publishers, 1996 4. R. Rajora, Integrated Watershed Management: Field Manual for Equitable, Productive and Sustainable Development, Rawat Publications, 2019		
Online Learning Resources:		
https://nptel.ac.in/courses/105101010 https://nptel.ac.in/courses/12615334		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code	ADVANCED STRUCTURAL ANALYSIS (PE – III)			L	T	P	C							
23A101312c				3	0	0	3							
Course Objectives:														
The objectives of this course are to make the student:														
Understand the fundamental concepts of arches, including three-hinged and two-hinged arches, and analyze the effects of horizontal thrust, bending moment, normal thrust, and radial shear. Apply the moment distribution method to analyze single-bay, single-story portal frames with and without side sway. Analyze continuous beams and portal frames using Kani's Method, including cases with and without settlement of supports. Solve structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects. Evaluate the stiffness method for analyzing continuous beams and single-bay portal frames with and without side sway, ensuring structural stability and performance.														
Course Outcomes (COs):														
Upon successful completion of this course, students will be able to:														
Explain the behavior of three-hinged and two-hinged arches and analyze the effects of horizontal thrust, bending moment, normal thrust, and radial shear. (<i>Bloom's Level: Understand - L2, Analyze - L4</i>) Apply the moment distribution method to analyze single-bay, single-story portal frames with and without side sway. (<i>Bloom's Level: Apply - L3, Analyze - L4</i>) Analyze continuous beams and portal frames using Kani's Method, including cases with and without settlement of supports. Solve structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects. Evaluate the stiffness method for analyzing continuous beams and single-bay portal frames with and without side sway, ensuring structural stability and performance.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	1	-	-	-	-	2	-	1	2	2
CO-2	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO-3	3	3	3	2	2	-	-	-	-	2	-	2	3	2
CO-4	3	2	3	3	3	-	-	-	-	2	1	2	3	3
CO-5	3	3	3	3	3	-	-	-	-	2	1	2	3	3
UNIT– I														
ARCHES: Three Hinged and Two Hinged Arches, Elastic Theory of Arches– Eddy's Theorem –Determination of Horizontal Thrust, Bending Moment, Normal Thrust and Radial Shear–Effect of Temperature–Determination of Horizontal Thrust Bending Moment, Normal Thrust and Radial Shear–Rib Shortening and Temperature Stresses.														



UNIT– II		
MOMENT DISTRIBUTION METHOD for FRAMES: -Analysis of Single Bay Single Storey Portal Frame Including Sides Way–Substitute Frame Analysis by Two Cycle Method.		
UNIT– III		
KANI’S METHOD: - Analysis of Continuous Beams with and Without Settlement of Supports-Single Bay Single Storey Portal Frames with and Without Side Sway.		
UNIT– IV		
FLEXIBILITY METHODS: - Flexibility Methods- Introduction-Application to Continuous Beams Including Support Settlements—Analysis of Single Bay Single Storey Portal Frames Without and With Side Sway.		
UNIT– V		
STIFFNESS METHODS: - Stiffness Methods – Introduction – Application to Continuous Beams Including Support Settlements – Analysis of Single Bay Single Storey Portal Frames Without and With Side Sway.		
TEXT BOOKS:		
1. Analysis of Structures by Vazrani & Ratwani – Khanna Publications. 2. Theory of Structures by Ramamurtham, Jain Book Depot, New Delhi.		
REFERENCEBOOKS:		
1. Structural Analysis by R.S. Khurmi, S. Chand Publications, New Delhi. 2. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd. 3. Theory of Structures by Gupta S.P., G.S. Pundit, and R. Gupta, Vol II, Tata McGraw Hill Publications Company Ltd. 4. D.S. Prakash Rao, Structural Analysis: A Unified Approach, Universities Press.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/106/105106050/		



CIVIL ENGINEERING														
III B.Tech–II Semester														
Course Code		DISASTER MANAGEM ENT (OE – II)								L	T		P	C
23A101313a										3	0		0	3
Course Objectives: The objectives of this course are to make the student: 1. To understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies. 2. To analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction. 3. To apply wind engineering principles and computational techniques in designing wind resistant structures. 4. To evaluate earthquake effects on buildings and develop strategies for seismic retrofitting. 5. To assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.														
Course Outcomes: After successful completion of this course, students will be able to: 1. Understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies. 2. Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction. 3. Apply wind engineering principles and computational techniques in designing wind resistant structures. 4. Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting. 5. Assess seismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	-	-	-	-	2	-	2	2	-	-	-	3	3
CO-2	-	3	-	-	2	-	-	-	-	-	-	2	3	-
CO-3	3	-	-	3	-	-	3	-	-	2	-	-	-	3
CO-4	-	-	3	-	3	-	-	2	-	-	-	-	3	-
CO-5	-	-	-	3	-	3	3	3	2	-	-	-	-	3
UNIT– I														
Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters inDifferent Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Soci economic Consequences).														



UNIT– II		
Cyclones and Their Impact–Climate Change and Its Impact on Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and Landslides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.		
UNIT– III		
Wind Engineering and Structural Response– Basic Wind Engineering, Aero dynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Alongand Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD). General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects on Buildings, towers, Glass Panels, Etc., and Wind-Resistant Featuresin Design. Codal Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas. Innovative Construction Materials and Techniques, Traditional Construction Techniques in CoastalAreas.		
UNIT– IV		
Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicenter, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides. Performance of Ground and Buildings in Past Earthquakes– Behavior of Various Types of Buildings and Structures, Collapse Patterns; Behavior of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies. Seismic Retrofitting– Weaknessin Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.		
UNIT– V		
Planning and Design Considerations for Seismic Safety– General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness Distribution, Soft Storey Effects, etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks. Construction Details– Various Types of Foundations, Soil Stabilization, Retaining Walls, Plinth Fill, Flooring, Walls, Openings, Roofs, Terraces, Parapets, Boundary Walls, Underground and Overhead Tanks, Staircases, and Isolation of Structures. Innovative Construction Materials and Techniques. Local Practices– Traditional Regional Responses. Computational Investigation Techniques.		
TEXT BOOKS:		
1. David Alexander, Natural Disasters, 1st Edition, CRC Press, 2017. 2. Edward A. Keller and Duane E. DeVecchio, Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes, 5th Edition, Routledge, 2019.		
REFERENCEBOOKS:		
1. Ben Wisner, J. C. Gaillard, and Ilan Kelman (Editors), Handbook of Hazards and Disaster Risk Reduction and Management, 2nd Edition, Routledge, 2012. 2. Damon P. Coppola, Introduction to International Disaster Management, 4th Edition, Butterworth-Heinemann, 2020. 3. Bimal Kanti Paul, Environmental Hazards and Disasters: Contexts, Perspectives and Management, 2nd Edition, Wiley-Blackwell, 2020.		
Online Learning Resources:		
https://nptel.ac.in/courses/124107010 https://onlinecourses.swayam2.ac.in/cec19_hs20/previous		



CIVIL ENGINEERING														
III B.Tech– II Semester														
CourseCode		SUSTAINABILITY IN ENGINEERING PRACTICES (OE – II)								L	T	P	C	
23A101313b										3	0	0	3	
Course Objectives: The objectives of this course are to make the student: 1. To understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials. 2. To analyze sustainable construction materials, their durability, and life cycle assessment. 3. To apply energy calculations in construction materials and assess their embodied energy. 4. To evaluate green building standards, energy codes, and performance ratings. 5. To assess the environmental effects of energy use, climate change, and global warming.														
Course Outcomes: After successful completion of this course, students will be able to: 1. Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials. 2. Analyze sustainable construction materials, their durability, and life cycle assessment. 3. Apply energy calculations in construction materials and assess their embodied energy. 4. Evaluate green building standards, energy codes, and performance ratings. 5. Assess the environmental effects of energy use, climate change, and global warming.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	-	-	-	-	2	3	2	-	-	-	-	3	3
CO-2	-	3	-	-	2	-	3	-	-	-	-	2	3	3
CO-3	-	-	3	3	3	-	2	-	-	2	-	-	3	3
CO-4	-	-	3	3	3	-	3	2	-	-	-	-	3	3
CO-5	-	-	-	-	-	3	3	3	-	-	-	-	-	3
UNIT– I														
INTRODUCTION Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO ₂ Contribution from Cement and Other Construction Materials.														
UNIT– II														
MATERIALS USED in SUSTAINABLE CONSTRUCTION Construction Materials and Indoor Air Quality - No/Low Cement Concrete – Recycled and Manufactured Aggregate - Role of QC and Durability - Life Cycle and Sustainability.														
UNIT– III														
ENERGY CALCULATIONS Components of Embodied Energy - Calculation of Embodied Energy for Construction Materials - Energy Concept and Primary Energy - Embodied Energy Via-A-Vis Operational Energy in Conditioned Building - Life Cycle Energy Use														



UNIT– IV		
GREEN BUILDINGS Control of Energy Use in Building-ECBC Code, Codes in Neighboring Tropical Countries - OTTV Concepts and Calculations – Features of LEED and TERI – GRIHA Ratings –Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modeling - Performance Ratings of Green Buildings - Zero Energy Building		
UNIT– V		
ENVIRONMENTAL EFFECTS Non-Renewable Sources of Energy and Environmental Impact– Energy Norm, Coal, Oil, Natural Gas- Nuclear Energy-Global Temperature, Green House Effects, GlobalWarming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.		
TEXT BOOKS:		
1. Charles J. Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers, 2016. 2. Steve Goodhew, Sustainable Construction Process, Wiley-Blackwell, UK, 2016.		
REFERENCEBOOKS:		
1. Craig A. Langston & Grace K. C. Ding, <i>Sustainable Practices in the Built Environment</i> , Butterworth-Heinemann Publishers, 2011. 2. William P. Spence, <i>Construction Materials, Methods & Techniques</i> (3rd Edition), Yesdee Publication Pvt. Ltd., 2012.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/105/105105157/		



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		HIGHWAY ENGINEERING LAB									L	T	P	C
23A101309P											0	0	3	1.5
Course Objectives:														
The objectives of this course are to make the student to:														
1. Understand the properties and behavior of aggregates and bitumen used in highway construction. 2. Perform standard laboratory tests on aggregates and bitumen to evaluate their suitability for road construction. 3. Analyze the strength, durability, and performance characteristics of pavement materials. 4. Assess the quality and compliance of highway materials with standard specifications. 5. Develop hands-on skills for material testing and interpretation of test results.														
Course Outcomes:														
Upon successful completion of this course, students will be able to:														
1. Determine the physical properties of coarse aggregates, such as specific gravity, water absorption, and shape characteristics. 2. Evaluate the mechanical properties of aggregates, including abrasion resistance, impact strength, and crushing value. 3. Analyze the physical and chemical properties of bituminous materials through standard tests. 4. Perform Marshall Stability tests and assess the optimum binder content for bituminous mixes. 5. Interpret test results to assess the suitability of aggregates and bitumen for pavement construction.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	1	3	3	1	-	1	-	2	3	3
CO-2	3	3	3	2	2	2	2	1	-	-	-	1	3	3
CO-3	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-4	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-5	2	2	2	1	3	3	3	1	-	1	1	2	2	2
List of Experiments:														
I. TEST ON AGGREGATES														
1. Specific Gravity Determination of the Coarse Aggregate Sample 2. Determination of Abrasion Value of the Coarse Aggregate Sample 3. Determination of Impact Value of Coarse Aggregate 4. Determination of Elongation Index of Coarse Aggregate 5. Determination of Flakiness Index of Coarse Aggregate 6. Determination of Aggregate Crushing Value of Coarse Aggregate														

**II. TEST ON BITUMEN**

1. Specific Gravity Determination of the Bitumen/Asphalt Sample
2. Penetration Test on Bitumen
3. Viscosity Determination of Bituminous Binder
4. Determination of Softening Point of the Asphalt/Bitumen Sample
5. Determination of Ductility Value of the Bitumen Sample
6. Estimation of Loss of Bitumen on Heating
7. Bitumen Extraction Test

Note: Minimum 10 out of the above experiments are to be carried out.

TEXT BOOKS:

1. Highway Material Testing Manual, Khanna, Justo and Veera Raghavan, Nemchand Brothers

REFERENCEBOOKS:

1. IS 383:1993 — Specification for Coarse and Fine Aggregates from Natural Sources for Concrete
2. IS 1201–1220 (1978) — Methods for Testing Tars and Bituminous Materials
3. IRC SP 53:2010 — Guidelines on Use of Modified Bitumen
4. *MS-2 Manual for Marshall's Mix Design (2002)

Online Learning Resources:

<https://ts-nitk.vlabs.ac.in/>



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		ENVIRONMENTAL ENGINEERINGLAB								L	T	P	C	
23A101310P										0	0	3	1.5	
Course Objectives:														
The objectives of this course are to make the student:														
1. Understand the principles and methods of water and wastewater sampling and preservation. 2. Perform standard laboratory tests to determine water quality parameters. 3. Analyze wastewater characteristics and assess pollution levels. 4. Evaluate the effectiveness of treatment processes using chemical and biological tests. 5. Develop hands-on skills in advanced laboratory techniques for environmental monitoring.														
Course Outcomes:														
Upon successful completion of this course, students will be able to:														
1. Apply appropriate sampling and preservation techniques for water and wastewater. 2. Measure physical and chemical parameters such as turbidity, conductivity, and chlorine content. 3. Analyze key water and wastewater quality indicators like BOD, COD, and TKN. 4. Assess the efficiency of water treatment processes through laboratory tests. 5. Perform microbiological analysis for coliform detection and sludge characterization.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	1	1	-	-	2	2	-	-	-	1	1	1	1
CO-2	2	2	1	-	-	1	1	-	-	-	1	1	2	2
CO-3	2	1	2	-	1	1	2	-	-	-	2	1	1	1
CO-4	1	1	1	1	-	1	1	-	-	-	1	1	2	2
CO-5	2	1	2	-	-	1	2	1	-	-	1	1	1	1
LIST OF EXPERIMENTS:														
I. ANALYSIS OF WATER SAMPLE														
1. Sampling and preservation methods for water and wastewater (Demonstration only) 2. Measurement of electrical conductivity and turbidity 3. Determination of fluoride in water by spectrophotometric method / ISE 4. Determination of iron in water (Demonstration) 5. Determination of sulphate in water 6. Determination of optimum coagulant dosage by jar test apparatus 7. Determination of available chlorine in bleaching powder and residual chlorine in water														
II. ANALYSIS OF WASTEWATER SAMPLE														
1. Estimation of suspended, volatile, and fixed solids 2. Determination of sludge volume index in wastewater 3. Determination of dissolved oxygen 4. Estimation of B.O.D. 5. Estimation of C.O.D.														



6. Determination of TKN and ammonia nitrogen in wastewater
7. Determination of total and faecal coliform (Demonstration only)

Note: Minimum 10 out of the above experiments are to be carried out.

TEXT BOOKS:

1. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
2. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

REFERENCE BOOKS:

1. Environmental Engineering Laboratory Manual by Dr.S.K. Panigrahi, L. Mohanty, S.K. Kataria & Sons

Online Learning Resources:

<https://ee1-nitk.vlabs.ac.in/>
<https://ee2-nitk.vlabs.ac.in/>



CIVIL ENGINEERING														
III B.Tech– II Semester														
Course Code		BUILDING INFORMATION MODELING								L	T	P	C	
23A101314										0	1	2	2	
Course Objectives:														
The objectives of this course are to make the student:														
1. Understand the fundamentals of Building Information Modeling (BIM) and Autodesk Revit. 2. Develop proficiency in Revit’s basic drawing and editing tools for structural and architectural modeling. 3. Create 3D models of buildings, including walls, floors, ceilings, roofs, stairs, and railings. 4. Analyze different components such as curtain walls, doors, windows, and structural elements. 5. Apply various visualization and detailing techniques to generate callouts, elevations, and sections														
Course Outcomes:														
Upon successful completion of this course, students will be able to:														
1. Explain the fundamentals of BIM and Autodesk Revit’s interface and workflow. 2. Use basic drawing, editing, and modification tools in Revit for creating and modifying models. 3. Model various architectural elements such as walls, doors, windows, floors, ceilings, and roofs. 4. Construct structural elements including grids, columns, stairs, railings, and ramps. 5. Generate 3D views, sections, and elevations for visualization and detailing purposes.														
CO–PO Articulation Matrix: -														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	2	3	1	-	-	-	1	-	2	3	3
CO-2	3	3	3	3	3	2	-	-	-	-	-	2	3	3
CO-3	3	3	3	3	3	3	1	-	-	-	-	2	3	3
CO-4	3	3	3	3	3	3	1	-	-	-	-	2	3	3
CO-5	2	2	2	2	3	3	1	-	-	1	1	2	2	2
List of Experiments: -														
1. INTRODUCTION TO BIM & AUTODESK REVIT – About Autodesk and AutoCAD, Workflow and BIM, Revit Terms, Overview of the Interface, Starting Projects, Viewing Commands. 2. BASIC DRAWING AND EDITING TOOLS – Using General Drawing Tools, Editing Elements, Working with Modification Tools. 3. SETTING UP LEVELS AND GRIDS – Setting up Levels and Grids, Creating Structural Grids, Adding Columns, Linking and Importing CAD Files. 4. MODELING WALLS – Modeling Walls, Modifying Walls, Modeling Exterior Shell, Adding Interior Walls. 5. WORKING WITH DOORS AND WINDOWS – Inserting Doors and Windows, Loading Door and Window Types from Library, Creating Additional Door and Window Sizes. 6. WORKING WITH CURTAIN WALLS – Creating Curtain Walls, Adding Curtain Grids, Working with Curtain Wall Panels, Attaching Mullions to Curtain Grids.														



7. WORKING WITH VIEWS – Setting the View Display, Duplicating Views, Adding Callout Views, Elevations and Sections.
8. ADDING COMPONENTS – Adding Components, Modifying Components, Working with Elements.
9. MODELING FLOORS – Modeling & Modifying Floors, Joining Geometry, Creating Shaft Openings, Creating Sloped Floors.
10. MODELING CEILINGS & ROOFS – Modeling Ceilings, Adding Ceiling Fixtures, Creating Ceiling Soffits, Modeling Roofs.
11. MODELING STAIRS AND RAILINGS – Creating Component Stairs, Modifying Component Stairs, Working with Railings, Sketching Custom Stairs, Creating Ramps.

TEXT BOOKS:

1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston —BIM HANDBOOK, Wiley, 2nd Edition, 2011
2. Wing, Eric. Autodesk Revit Architecture 2017: No Experience Required. Indianapolis: John Wiley & Sons, 2016

REFERENCE BOOKS:

1. Kim, Marcus, Lance Kirby, and Eddy Krygiel. Mastering Autodesk Revit 2017 for Architecture. 1st ed., Indianapolis, IN: John Wiley & Sons, 2016.
2. Garber, Richard. BIM Design: Realizing the Creative Potential of Building Information Modeling. AD Smart 02, Chichester, U.K.: Wiley, 2004.
3. Peter B. and Nigel D. BIM in Principle and in Practice, 1st Edition, ICE Publishing, 2014.
4. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, Chuck Eastman, Paul Teicholz, Rafael Sacks, and Kathleen Liston, John Wiley & Sons, 2008.
5. BIM and Construction Management: Proven Tools, Methods, and Workflows, Brad Hardin, Sybex, 2009.
6. Building Information Modeling: BIM in Current and Future Practice, Karen Kensek and Douglas Noble, Wiley, 2014, First Edition.

Online Learning Resources:

<https://minnodillc.com/building-information-modeling-bim/>
<https://www.skyfilabs.com/online-courses/building-information-modelling-course>

**III B.Tech I Semester**

L	T	P	C
3	0	0	3

**(23A102305) ELECTRICAL SAFETY PRACTICES AND STANDARDS
(OpenElective-I)**

Course Outcomes:**CO1:** Understanding the Fundamentals of Electrical Safety-L2**CO2:** Identifying and Applying Safety Components -L3**CO3:** Analyzing Grounding Practices and Electrical Bonding**CO4:** Applying Safety Practices in Electrical Installations and Environments-L4**CO5:** Evaluating Electrical Safety Standards and Regulatory Compliance-L5**UNIT I****Introduction To Electrical Safety:**

Fundamentals of Electrical safety – Electric Shock – physiological effects of electric current – Safety requirements – Hazards of electricity – Arc - Blast-Causes for electrical failure.

UNIT II**Safety Components:**

Introduction to conductors and insulators- voltage classification -safety against over voltages- safety against static electricity-Electrical safety equipment 's-Fire extinguishers for electrical safety.

UNIT III**Grounding:**

General requirements for grounding and bonding- Definitions- System grounding- Equipment grounding -The Earth-Earthling practices - Determining safe approach distance- Determining arc hazard category.

UNIT IV**Safety Practices:**

General first aid – Safety in handling hand held electrical appliances tools- Electrical safety in train stations – swimming pools, external lighting installations, medical locations Casestudies.

UNIT V**Standards For Electrical Safety:**

Electricity Acts- Rules & regulations- Electrical standards-NFPA 70 E-OSHA standards - IEEE standards - National Electrical Code 2005 – National Electric Safety code NESC -Statutory requirements from electrical in spectorate.

TEXTBOOKS:

1. Massimo A.G. Mitolo, —Electrical Safety of Low-Voltage Systemsll, Mc GrawHill, USA, 2009.
2. Mohamed El-Sharkawi, —Electric Safety-Practice and Standardsll, CRC Press, USA, 2014

REFERENCES:

1. Kenneth G. Mastrullo, RayA.Jones, —The Electrical Safety Program Bookl,



- Jones and Bartlett Publishers, London, 2nd Edition, 2011.
2. Palmer Hickman, —Electrical Safety- Related Work Practices, Jones & Bartlett Publishers, London, 2009.
 3. Fordham Cooper, W., —Electrical Safety Engineering, Butter worth and Company, London, 1986.
 4. John Cadick, Mary Capelli- Schellpfeffer, DennisK. Neitzel, —Electrical Safety Handbook, McGraw- Hill, NewYork, USA, 4th edition, 2012.



TECHNICAL PAPER WRITING AND INTELLECTUAL PROPER RIGHTS

Course Code: 23A100043

Semester V

L T P C : 2 0 0 0

Course Objectives: ·

1. To enable the students to practice the basic skills of research paper writing
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real-life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks

Course Outcomes: On successful completion of this course, the students will be able to:

COURSE OUTCOMES: At the end of the course, students will be able to		BloomsLevel
CO1	Identify key secondary literature related to their proposed technical paper writing	L1, L2
CO2	Explain various principles and styles in technical writing	L1, L2
CO3	Use the acquired knowledge in writing a research/technical paper	L3
CO4	Analyse rights and responsibilities of holder of Patent, Copyright, trademark, International Trademark etc.	L4
CO5	Evaluate different forms of IPR available at national & international level	L5
CO6	Develop skill of making search of various forms of IPR by using Modern tools and techniques.	L3, L6

SYLLABUS

UNIT – I:

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language - highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

UNIT–II:

Technical Research Paper Writing: Abstract-Objectives-Limitations-Review of Literature-Problems and Framing Research Questions- Synopsis.

UNIT–III:

Process of research: publication mechanism: types of journals- indexing-seminars- conferences-proof reading–plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules

**UNIT–IV:**

Introduction to Intellectual property: Introduction, types of intellectual property, International organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting evaluating trade mark, trade mark registration processes.

UNIT–V:

Law of copy rights: Fundamentals of copyright law, originality of material, rights of reproduction, Rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copy right, international copy right law

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer. Patent law, intellectual property audits.

Textbooks:

1. Deborah.E. Bouchoux, *IntellectualPropertyRights*, CengageLearningIndia,2013
2. Meenakshi Raman, Sangeeta Sharma. *Technical Communication: Principles and practices*. Oxford.

ReferenceBooks:

1. R. Myneni, *Law of Intellectual Property*, 9th Ed, AsialawHouse, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights* Tata Mcgraw Hill, 2001
3. P. Naryan, *IntellectualPropertyLaw*, 3rd Ed, Eastern Law House, 2007.
4. Adrian Wallwork. *English for Writing Research Papers* Second Edition. Springer Cham Heidelberg New York ,2016
5. DanJones, SamDragga, *Technical Writing Style*

OnlineResources

1. <https://theconceptwriters.com.pk/principles-of-technical-writing/>
2. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
3. <https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html>
4. <https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/>
5. <https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf>
6. <https://lawbhoomi.com/intellectual-property-rights-notes/>



B.TECH.-CIVIL ENGINEERING IV YEAR COURSE STRUCTURE & SYLLABI

IV B.Tech I Semester

S. No.	Course code	Title	L	T	P	Credits
1	23A101401	Finite Element Methods	3	0	0	3
2	23A100702a 23A100702b 23A100702c	Management Course-II 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	2	0	0	2
3	23A101402a 23A101402b 23A101402c	Professional Elective-IV 1. Geo-synthetics and Reinforced Earth Structures 2. Railways, Airports, Docks and Harbour Engineering 3. Experimental Stress Analysis	3	0	0	3
4	23A101403a 23A101403b 23A101403c	Professional Elective-V 1. Ground Improvement Techniques 2. Subsurface Investigation and Instrumentation 3. Transportation Economics	3	0	0	3
5		Open Elective-III	3	0	0	3
6		Open Elective-IV	3	0	0	3
7	23A101406	Skill oriented course Skills in Civil Engineering software (STAADPRO/CAD/TEKL)	0	1	2	2
8	23A100059	Audit Course Gender Sensitization	2	0	0	-
9	23A101407	Evaluation of Industry Internship	-	-	-	2
Total			19	1	2	21

Open Elective – III

S.No	Course Code	Course Name	Offered by the Dept.
1	23A102407	Smart Grid Technologies	EEE
2	23A103704	3D Printing Technologies	ME
3	23A104404	Microprocessors and Microcontrollers	ECE
4	23A105207	Data Base Management Systems	CSE & Allied/IT
5	23A105309b	Cyber Security	
6	23A100050	Wavelet transforms and its applications	Mathematics
7	23A100051	Smart Materials and Devices	Physics
8	23A100052	Green Chemistry and Catalysis for Sustainable Environment	Chemistry
9	23A100053	Employability Skills	Humanities

**Open Elective – IV**

S. No	Course Code	Course Name	Offered by the Dept.
1	23A102408	Electric Vehicles	EEE
2	23A103703c	Total Quality Management	ME
3	23A104405	Transducers and Sensors	ECE
4	23A105302	Computer Networks	CSE & Allied/IT
5	23A105401d	Internet of Things	
6	23A100054	Financial Mathematics	Mathematics
7	23A100055	Sensors And Actuators for Engineering Applications	Physics
8	23A100056	Chemistry Of Nanomaterials and Applications	Chemistry
9	23A100057	Literary Vibes	Humanities

IV B.Tech. II Semester

S.No.	Course code	Title	Category	L	T	P	Credits
1	23A101408	Internship		-	-		4
		Project					8
Total							12



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	FINITE ELEMENT METHODS									L	T	P	C	
23A101401										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand the fundamental principles of the Finite Element Method (FEM) and its applications in structural analysis. 2. Apply the concepts of elasticity, stress-strain relationships, and displacement functions in FEM. 3. Develop finite element formulations for 1D, 2D, and 3D elements. 4. Analyze bar, beam, and plane stress/strain problems using shape functions and stiffness matrices. 5. Implement solution techniques such as numerical integration, static condensation, and element assembly.														
Course Outcomes (COs): Upon successful completion of this course, students will be able to: 1. Explain the basic principles, advantages, and limitations of FEM in engineering applications. 2. Derive shape functions and stiffness matrices for 1D bar and beam elements. 3. Analyze continuous beams and plane stress/strain problems using FEM. 4. Develop isoparametric formulation for 2D elements such as CST and LST. 5. Implement solution techniques for assembling elements and solving FEM equations.														
CO – PO Articulation Matrix:-														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	2	2	2	2	-	-	-	-	-	-	2	3	3
CO -2	3	3	3	3	3	-	-	-	-	-	-	2	3	3
CO -3	3	3	3	3	3	-	-	-	-	-	-	2	3	3
CO -4	3	3	3	3	3	-	-	-	-	-	-	2	3	3
CO -5	2	2	2	2	3	-	-	-	-	1	-	2	2	2

UNIT – I
Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain Equation – Concept of Plane Stress – Plane Strain Advantages and Disadvantages of FEM. Element Shapes – Nodes – Nodal Degree of Freedom Displacement Function – Natural Coordinates – Strain Displacement Relations.
UNIT – II
Lagrangian– Serendipity Elements – Hermite Polynomials – Regular, Irregular 2 D & 3D – Element – Shape Functions Up to Quadratic formulation. Finite Element Analysis (FEA) of – One-Dimensional Problems – Bar Element – Shape Functions Stiffness Matrix – Stress – Strain Relation
UNIT – III
FEA Beam Elements – Stiffness Matrix - Shape Function– Analysis of Continuous Beams.
UNIT – IV
FEA Two-Dimensional Problem – CST – LST Element – Shape Function – Stress – Strain. Isoparametric formulation – Concepts of, Isoparametric Elements for 2D Analysis - Formulation of CST Element.
UNIT – V
Solution Techniques: Numerical Integration, Static Condensation, Assembly of Elements and Solution Techniques for Static Loads.
TEXT BOOKS:
1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning India Pvt. Ltd.
2. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D.



Belegundu, Prentice Hall of India
REFERENCE BOOKS:
1. Finite Element Aanalysis by P. Seshu, PHI Learning Private Limited 2. Concepts and applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd. 3. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishing House Pvt. Ltd.
Online Learning Resources:
https://archive.nptel.ac.in/courses/105/105/105105041/# https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-me43/



Course code 23A100702a	BUSINESS ETHICS AND CORPORATE GOVERNANCE Management Course- II	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES: The objectives of this course are					
1	To make the student understand the principles of business ethics				
2	To enable them in knowing about the ethics in management				
3	To facilitate the student 'role in corporate culture				
4	To impart knowledge about the fair-trade practices				
5	To encourage the student in knowing about the corporate governance				

UNIT-I: Ethics Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior..Value systems - Business Ethics - Types, Characteristics, Factors, Contradictions and Ethical Practices in Management -Corporate Social Responsibility – Issues of Management – Crisis Management.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Analyze issues & crisis of management

UNIT-II: ETHICS IN MANAGEMENT Introduction- Ethics in production, finance, Human resource management and Marketing Management - The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures - Culture and Individual Ethics – professional ethics and technical ethics.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand the meaning of Ethics in various areas of management
- Compare and contrast professional ethics and technical ethics
- Develop ethical values in self and organization

UNIT-III: CORPORATE CULTURE Introduction - Meaning, definition, Nature, and significance – Key elements of corporate culture, shared values, beliefs and norms, rituals, symbols and language - Types of corporate culture, hierarchical culture, market driven culture – Organization leadership and corporate culture, leadership styles and their impact on culture, transformational leadership and culture change.

LEARNING OUTCOMES: -After completion of this unit student will

- Define corporate culture
- Understand the key elements of corporate culture
- Analyze organization leadership and corporate culture

UNIT- IV: LEGAL FRAME WORK

Law and Ethics -Agencies enforcing Ethical Business Behavior - Legal Impact – Environmental Protection, Fair Trade Practices, legal Compliances, Safeguarding Health and wellbeing of Customers – Corporate law, Securities and financial regulations, corporate governance codes and principles.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand Law and Ethics
- Analyze Different fair-trade practices
- Make use of Environmental Protection and Fair-Trade Practices



UNIT -V: CORPORATE GOVERNANCE Introduction - Meaning – Corporate governance code, transparency & disclosure -Role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work - Corporate scams - Committees in India and abroad, corporate social responsibility. BoDs composition, Cadbury Committee – Various committees - Reports - Benefits and Limitations.

LEARNING OUTCOMES: -After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders in corporate governance
- Implementing corporate social responsibility in India.

Text books.

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017
2. Bholanath Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

Reference books

1. Dr. K. Nirmala, KarunakaraReddy. *Business Ethics and Corporate Governance*, HPH
2. H.R.Machiraju: *Corporate Governance*, HPH, 2013
3. K. Venkataramana, *Corporate Governance*, SHBP.
4. N.M.Khandelwal. *Indian Ethos and Values for Managers*

COURSE OUTCOMES: At the end of the course, students will be able to		BTL
CO1	Understand the Ethics and different types of Ethics.	L2
CO2	Understand business ethics and ethical practices in management	L2
CO3	Understand the role of ethics in management	L2
CO4	Apply the knowledge of professional ethics & technical ethics	L3
CO5	Analyze corporate law, ethics, codes & principles	L4
CO6	Evaluate corporate governance & corporate scams	L5

BTL = Bloom's Taxonomy Level

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_mg46/
2. <https://archive.nptel.ac.in/courses/110/105/110105138/>
3. https://onlinecourses.nptel.ac.in/noc21_mg54/
4. https://onlinecourses.nptel.ac.in/noc22_mg54/
5. <https://archive.nptel.ac.in/courses/109/106/109106117/>



Course code 23A100702b	E-BUSINESS (Management Course-II)	L	T	P	C
		2	0	0	2

Course Objectives: The Objectives of this course are					
1	To provide knowledge on emerging concept on E-Business related aspect.				
2	To understand various electronic markets & business models.				
3	To impart the information about electronic payment systems & banking.				
4	To create awareness on security risks and challenges in E-commerce.				
5	To the students aware on different e-marketing channels & strategies.				

Unit-I: Electronic Business Introduction – Nature, meaning, significance, functions and advantages
 - Definition of Electronic Business - Functions of Electronic Commerce (EC)-Advantages & Disadvantages of E-Commerce –E-Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

Learning Outcomes: -After completion of this unit student

- Understand the concept of E-Business
- Contrast and compare E-Commerce & E-Business
- Evaluate opportunities of E-commerce for industry

Unit-II: Electronic Markets and Business Models Introduction –E-Shops-E-Malls E-Groceries
 - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals -Business Models- Business to Business (B2B)-Business to Customers(B2C) - Business to Government(B2G)-Auctions-B2B Portals in India

Learning Outcomes: -After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze the B2B, B2C and B2G model

Unit-III: Electronic Payment Systems: Introduction to electronic payment systems (EPS) -Types of electronic payments - Credit/debit cards, e-wallets, UPI, and crypto currencies -Smart cards and digital wallets: Features and usage -Electronic Fund Transfer (EFT): Role in business transactions – Infrastructure requirements and regulatory aspects of e-payments.

Learning Outcomes: -After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and smart cards
- Analyze debit card and credit cards

Unit-IV:E-Security

Security risks and challenges in electronic commerce - Cyber threats - Phishing, hacking, identity theft, and malware - Digital Signatures & Certificates - Security protocols over public networks (HTTP, SSL, TLS) -Firewalls in securing e-business platforms.

Learning Outcomes: -After completion of this unit student will

- Understand E-Security
- Contrast and compare security protocols and public network
- Evaluate on Digital signature

Unit-V:E-Marketing: Introduction – Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Market Research– – E-marketing planning: Online branding, social media marketing, and email marketing - E-business strategies: Digital advertising, content marketing, and analytics – E-Customer Relationship Management (eCRM) E-supply chain management (e-SCM)

Learning Outcomes: -After completion of this unit student will



- Understand the concept of online marketing
- Apply the knowledge of online marketing
- Compare e-CRM and e-SCM

Text Books:

1. Arati Oturkar & Sunil Khilari. *E-Business*. Everest Publishing House, 2022
2. P.T.S Joseph. *E-Commerce*, Fourth Edition, Prentice Hall of India, 2011

References:

1. Debjani, Kamallesh K Bajaj. *E-Commerce*, Second Edition Tata McGraw-Hill's, 2005
2. Dave Chaffey. *E-Commerce E-Management*, Second Edition, Pearson, 2012.
3. Henry Chan. *E-Commerce Fundamentals and Application*, Raymond Leatham Wiley India 2007
4. S. Jaiswal. *E-Commerce* Galgotia Publication Pvt Ltd., 2003.

COURSE OUTCOMES: At the end of the course student will be able to		BTL
CO1	Remember E-Business & its nature, scope and functions.	L1
CO2	Understand E-market-Models which are practicing by the organizations	L2
CO3	Apply the concepts of E-Commerce in the present globalized world.	L3
CO4	Analyze the various E-payment systems & importance of net banking.	L4
CO5	Evaluate market research strategies & E-advertisements.	L5
CO6	Understand importance of E-security & control	L2

BTL = Bloom's Taxonomy Level

Online Resources:

- <https://www.slideshare.net/fatimahAlkreem/e-businessppt-67935771>
<https://www.slideshare.net/VikramNani/e-commerce-business-models>
<https://www.slideshare.net/RiteshGoyal/electronic-payment-system>
<https://www.slideshare.net/WelingkarDLP/electronic-security>
<https://www.slideshare.net/Ankitha2404/emarketing-ppt>



Course code 23A100702c	MANAGEMENT SCIENCE	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES: The objectives of this course are

1	To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2	To make the students understand the role of management in Production
3	To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
4	To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
5	To make the students aware of the contemporary issues in modern management

UNIT- I INTRODUCTION TO MANAGEMENT Management - Concept and meaning - Nature- Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor 's Scientific Theory-Henry Fayol's principles - Elton Mayo's Human relations - **Organizational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure of an enterprise.

UNIT - II OPERATIONS MANAGEMENT Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- **Material Management** - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - **Marketing Management** - Concept - Meaning - Nature-Functions of Marketing – Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand the core concepts of Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT – III HUMAN RESOURCES MANAGEMENT (HRM) HRM - Definition and Meaning – Nature - Managerial and Operative functions - Job Analysis - Human Resource Planning (HRP) – Employee Recruitment-Sources of Recruitment - Employee Selection - Process - Employee Training and Development - methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

LEARNING OUTCOMES: At the end if the Unit, the students will be able to

- Understand the concepts of HRM, Recruitment, Selection, Training & Development
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages



UNIT - IV STRATEGIC & PROJECT MANAGEMENT Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - Network Analysis – Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis – Project Crashing (Simple problems).

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques

UNIT - V CONTEMPORARY ISSUES IN MANAGEMENT Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management (SCM) - Enterprise Resource Planning (ERP) - Performance Management – employee engagement and retention - Business Process Re-engineering and Bench Marking - Knowledge Management – change management – sustainability and corporate social responsibility.

LEARNING OUTCOMES At the end if the Unit, the students will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in TQM, SCM
- Analyze CRM, BPR
- Evaluate change management & sustainability

Text Books:

1. Frederick S. Hillier, Mark S. Hillier. *Introduction to Management Science*, October 26, 2023
2. A.R Aryasri, *Management Science*, TMH, 2019

References:

1. Stoner, Freeman, Gilbert. *Management*, Pearson Education, New Delhi, 2019.
2. Koontz & Weihrich, *Essentials of Management*, 6/e, TMH, 2005.
3. Thomas N. Duening & John M. Ivancevich, *Management Principles and Guidelines*, Biztantra.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
4. Samuel C. Certo, *Modern Management*, 9/e, PHI, 2005

COURSE OUTCOMES: At the end of the course, students will be able to		BTL
CO1	Remember the concepts & principles of management and designs of organization in a practical world	L1
CO2	Understand the knowledge of Work-study principles & Quality Control techniques in industry	L2
CO3	Apply the process of Recruitment & Selection in organization.	L3
CO4	Analyze the concepts of HRM & different training methods.	L4
CO5	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.	L5
CO6	Create awareness on contemporary issues in modern management & technology.	L3

BTL = Blooms Taxonomy Level

ONLINE RESOURCES:

1. <https://www.slideshare.net/slideshow/introduction-to-management-and-organization-231308043/231308043>
2. <https://nptel.ac.in/courses/112107238>
3. <https://archive.nptel.ac.in/courses/110/104/110104068/>



4. <https://archive.nptel.ac.in/courses/110/105/110105069/>
5. https://onlinecourses.nptel.ac.in/noc24_mg112/



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	GEO SYNTHETICS AND REINFORCED EARTH STRUCTURES (Professional Elective-IV)									L	T	P	C	
23A101402a										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand the concept and applications of reinforced earth, including friction coefficient determination. 2. Analyze the classification, functions, and durability aspects of geosynthetics and their advantages over conventional materials. 3. Design reinforced earth retaining walls considering stability mechanisms and material selection. 4. Evaluate the performance of reinforced embankments and their foundation mattresses for settlement and stability control. 5. Develop reinforced soil beds and analyze reinforced pavements using standard design approaches.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain the fundamentals of reinforced earth and analyze the effects of reinforcement on soil properties. 2. Compare different types of geosynthetics, their functions, and durability aspects in geotechnical applications. 3. Design reinforced earth retaining walls considering stability mechanisms and reinforcement layouts. 4. Evaluate reinforced embankments and foundation mattresses with respect to settlement and load-bearing capacity. 5. Design and analyze reinforced pavements and soil beds using standard methodologies.														
CO – PO Articulation Matrix:-														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	2	1	1	1	-	1	1	-	-	1	-	1	1	1
CO -2	2	1	2	1	1	-	1	-	-	-	-	1	1	1
CO -3	2	1	2	1	1	-	1	-	-	-	-	1	1	1
CO -4	2	1	2	1	1	1	1	-	-	-	-	1	1	1
CO -5	2	1	2	1	1	1	2	-	-	-	-	1	2	1
UNIT – I														
Reinforced Earth: Concept, Effects of Reinforcement on Soils – Equal Confining and Pseudo Cohesion Concepts, Materials, Friction Coefficient – Definition, Laboratory Determination, Factors Affecting Friction Coefficient; Application of Reinforced Earth														
UNIT – II														
Geosynthetics - Advantages Over Conventional Materials - Classification Based on Material Type and Function - Types of Geosynthetics - Functions of Geosynthetics - Tests on Geosynthetics - Durability Aspects of Geosynthetics - Applications of Geosynthetics														
UNIT – III														
Reinforced Earth Retaining Walls: Introduction, Stability Mechanisms, Design of Reinforced Earth Retaining Wall - Selection of Materials - Geotechnical Analysis - Reinforcement Layout and Spacing - Stability Analysis - Advantages Over Conventional Retaining Walls														
UNIT – IV														



Reinforced Embankments: Introduction, Design of Reinforced Embankment, Foundation Mattress Below the Embankment - Purpose and Function of Foundation Mattresses - Components of Reinforced Mattress - Design of Reinforced Mattress - Design Calculations for Settlement Control, Bearing Capacity, and Long-Term Performance. Field Implementation and Monitoring Techniques
UNIT – V
Reinforced Soil Beds: Introduction, Factors Affecting the Behaviour of Reinforced Soil Beds, Analysis and Design Reinforced Pavements: Benefits of Placing Reinforcement in Flexible Pavement Layers, Design of Reinforced Pavements by Giroud and Noiray Approach and Modified CBR Method.
TEXT BOOKS:
1. An Introduction to Soil Reinforcement and Geosynthetics By G.L. Siva Kumar Babu, University Press 2. Fundamentals of Geosynthetics Engineering, Sanjay Kumar Shukla and Jian-Hua Yin, CRC Press, 2017, 1st edition. 3. Reinforced Soil and its Engineering Applications, Swami Saran, I.K. International Publishing House Pvt. Ltd., 2019, 1st edition.
REFERENCE BOOKS:
1. Designing with Geosynthetics by Robert M Koerner, R.M. Pearson Education Inc., 2012, 6th edition 2. Advances in Geosynthetics by G. Venkatapparao, Sai Master Geo environmental Services Pvt. Ltd. Publications 3. Designing with Geosynthetics, Koerner, R.M., Pearson Education Inc., 2012, 6th edition 4. IS:13162-1992; IS:14293& 94-1995; IS:14324-1995; IS:14714-1999, Geotextiles – Methods of Tests 5. IRC: SP:102-2014: Guidelines for design and construction of reinforced soil walls
Online Learning Resources:
https://archive.nptel.ac.in/courses/105/106/105106052/ https://onlinecourses.nptel.ac.in/noc20_ce06/preview



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	RAILWAYS, AIRPORTS, DOCKS AND HARBOR ENGINEERING (Professional Elective-IV)									L	T	P	C	
23A101402b										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand the components and geometric design principles of railway tracks. 2. Analyze the principles of railway track design, signaling, and interlocking. 3. Evaluate airport site selection, runway orientation, and terminal area planning. 4. Design runways and taxiways based on aircraft characteristics and geometric elements. 5. Assess the requirements and classification of ports, harbors, docks, and navigation aids.														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain railway track components, functions, and requirements. 2. Apply geometric design principles to railway track layout and interlocking systems. 3. Evaluate airport planning aspects, including site selection, runway design, and terminal planning. 4. Design runways and taxiways based on geometric standards and safety regulations. 5. Analyze ports and harbor structures, including docks, breakwaters, and navigation aids.														
CO – PO Articulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	1	1	-	-	1	-	-	-	1	-	1	1	1
CO -2	3	2	2	1	2	-	-	-	-	-	-	1	2	1
CO -3	3	2	3	2	2	-	1	-	-	-	-	1	2	2
CO -4	3	1	2	2	3	1	-	-	-	-	-	1	2	2
CO -5	3	2	2	1	2	1	-	-	-	-	-	1	2	1
UNIT – I														
Railway Engineering Introduction – Permanent Way Components – Cross Section of Permanent Way – Functions and Requirements of Rails, Sleepers and Ballast – Types of Gauges – Creep of Rails – Theories Related to Creep – Coning of Wheels – Adzing of Sleepers – Rail Fastenings														
UNIT – II														
Geometric Design of Railway Track Gradients – Grade Compensation – Cant and Negative Super Elevation – Cant Deficiency – Degree of Curves – Safe Speed on Railway Track – Points and Crossings – Layout and Functioning of Left Hand Turn Out and Right-Hand Turn Outs – Station Yards – Signaling and Interlocking														
UNIT – III														
Airport Engineering Airport Site Selection – Factors Affecting Site Selection and Surveys- Runway Orientation – Wind Rose Diagram – Basic Runway Length – Correction for Runway Length – Terminal Area – Layout and Functions – Concepts of Terminal Building – Simple Building, Linear Concept, Pier Concept and Satellite Concept – Typical Layouts														
UNIT – IV														



Geometric design of runways and taxiways Aircraft Characteristics – Influence of Characteristics on Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications - Functions of Taxiways – Taxiway Geometric Design – Geometric Elements and Standard Specifications – Runway and Taxiway Lighting.
UNIT – V
Ports and Harbors Harbours - Requirements of Ports and Harbors – Types of Ports – Classification of Harbors – Docks and Types of Docks – Dry Docks, Wharves and Jetties – Breakwaters: Layouts of Different Types of Harbors and Docks – Dredging Operations – Navigation Aids
TEXT BOOKS:
1. A Text Book of Railway Engineering-S.C. Saxena and S.Arora, Dhanpatrai and Sons, New Delhi 2010 2. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech Publishers
REFERENCE BOOKS:
1. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 200 2. Railway Track Engineering by J.S. Mundrey McGraw Hill Education 5th edition 2017 3. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001)
Online Learning Resources:
https://nptel.ac.in/courses/105107123 https://archive.nptel.ac.in/courses/114/106/114106025/ https://www.mkube.co.in/product-detail/railways-airports-docks-and-harbour-engineering



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	EXPERIMENTAL STRESS ANALYSIS (Professional Elective-IV)									L	T	P	C	
23A101402c										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand the principles and advantages of experimental stress analysis. 2. Explain strain measurement techniques using strain gauges and their applications. 3. Analyze strain rosettes and apply non-destructive testing methods for concrete. 4. Understand the fundamental principles of photoelasticity and its applications. 5. Apply two-dimensional photoelasticity methods for stress analysisin materials.														
Course Outcomes (COs): Upon successful completion of the course, students will be able to: 1. Explain the principles and merits of experimental stress analysis. 2. Demonstrate strain measurement using various strain gauge techniques. 3. Analyze strain rosette data and evaluate concrete structures using NDT methods. 4. Apply the theory of photoelasticity to determine stress distributionsin materials. 5. Utilize two-dimensional photoelasticity techniques for experimental stress analysis.														
CO – PO Articulation Matrix:-														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	2	-	-	-	2	-	-	-	1	-	1	1	1
CO -2	3	2	2	2	2	3	-	-	-	-	-	1	2	2
CO -3	2	2	3	2	2	3	2	-	-	-	-	1	2	2
CO -4	3	2	2	2	2	3	2	-	-	-	-	1	2	2
CO -5	2	2	2	2	2	3	2	-	-	-	-	1	2	2
UNIT – I														
PRINCIPLES of EXPERIMENTAL APPROACH Merits of Experimental Analysis Introduction, Uses of Experimental Stress Analysis Advantages of Experimental Stress Analysis, Different Methods –Simplification of Problems														
UNIT – II														
STRAIN MEASUREMENT USING STRAIN GAUGES Definition of Strain and Its Relation of Experimental Determinations Properties of Strain- Gauge Systems-Types of Strain Gauges –Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical Strain Gauges - Inductance Strain Gauges – LVDT – Resistance Strain Gauges – Various Types –Gauge Factor – Materials of Adhesion Base														
UNIT – III														
STRAIN ROSSETTES and NON – DESTRUCTIVE TESTING of CONCRETE Introduction – The Three Elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity Method –Application to Concrete. Hammer Test – Application to Concrete.														
UNIT – IV														
THEORY of PHOTOELASTICITY Introduction –Temporary Double Refraction – The Stress Optic Law –Effects of Stressed Modeling A Polar Scope for Various Arrangements – Fringe Sharpening. Brewster’s Stress Optic Law														
UNIT – V														



TWO-DIMENSIONAL PHOTOELASTICITY Introduction – Isochromic Fringe Patterns- Isoclinic Fringe Patterns Passage of Light Through Plane Polariscope and Circular Polariscope - Isoclinic Fringe Patterns – Compensation Techniques – Calibration Methods – Separation Methods – Scaling Model to Prototype Stresses – Materials for Photo – Elasticity Properties of Photoelastic Materials.

TEXT BOOKS:

1. Experimental stress analysis by J.W.Dally and W.F.Riley, College House Enterprises 2005
2. Experimental stress analysis by Dr.SadhuSingh.khanna Publishers 4th edition

REFERENCE BOOKS:

1. Experimental Stress analysis by U.C.Jindal, Pearson Publications 2012 edition
2. Experimental Stress Analysis by L.S.Srinath, MC.Graw Hill Company Publishers

Online Learning Resources:

<https://archive.nptel.ac.in/courses/112/106/112106068/#>
<https://archive.nptel.ac.in/courses/112/106/112106198/#>



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	GROUND IMPROVEMENT TECHNIQUES (Professional Elective-V)									L	T	P	C	
23A101403a										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand various dewatering methods, including sumps, well points, and electro-osmosis, for effective groundwater control. 2. Analyze the properties and applications of grouts, grouting techniques, and post-grouting tests for soil and rock stabilization. 3. Evaluate different densification techniques for granular and cohesive soils, such as vibro-compaction, preloading, and thermal methods. 4. Apply stabilization techniques, including mechanical, chemical, and bituminous stabilization, to improve soil properties. 5. Assess the design principles of reinforced earth walls and the role of geosynthetics in soil improvement and slope stability. (Bloom's Level: Evaluate - L5)														
Course Outcomes (COs): After successful completion of this course, students will be able to: 1. Explain the methods of dewatering and grouting and their importance in foundation engineering. 2. Analyze densification techniques for granular and cohesive soils to enhance soil strength. 3. Evaluate the effectiveness of soil stabilization methods for different ground conditions. 4. Apply reinforced earth principles and geosynthetics for soil retention and foundation stability. 5. Assess expansive soil problems, their identification methods, and suitable foundation techniques like under-reamed piles.														
CO – PO Articulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	2	2	2	1	-	-	-	-	2	-	1	2	2
CO -2	3	3	2	2	2	-	-	-	-	2	-	2	2	2
CO -3	3	3	3	2	2	-	-	-	-	2	-	2	3	2
CO -4	3	2	3	3	3	-	-	-	-	2	1	2	3	3
CO -5	3	3	3	3	3	-	-	-	-	2	1	2	3	3
UNIT – I														
INTRODUCTION: Introduction to Ground Improvement- Need and objectives of ground improvement- Problems of Expansive Soils – Tests for Identification – Methods of Determination of Swell Pressure. Improvement of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles.														
UNIT – II														
STABILIZATION: Methods of Stabilization-Mechanical-Cement- Lime-Bituminous-Chemical Stabilization with Calcium Chloride, Sodium Silicate and Gypsum. GROUTING: Objectives of Grouting- Grouts and Their Properties- Grouting Methods- Ascending, Descending and Stage Grouting- Hydraulic Fracturing in Soils and Rocks- Post Grout Test.														
UNIT – III														



DENSIFICATION METHODS: In – Situ Densification Methods in Granular Soils: – Vibration at The Ground Surface, Impact at The Ground Surface, Vibration at Depth, Impact at Depth. In – Situ Densification Methods in Cohesive Soils: – Preloading or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geodrains – Stone and Lime Columns – Thermal Methods.

UNIT – IV

DEWATERING: Methods of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains-Blanket Drains - Criteria for Selection of Fill Material Around Drains –Electro-Osmosis.

UNIT – V

REINFORCED EARTH: Principles – Components of Reinforced Earth – Factors Governing Design of Reinforced Earth Walls – Design Principles of Reinforced Earth Walls.

GEOSYNTHETICS: Geotextiles- Types, Functions and Applications – Geogrids and Geo Membranes – Functions and Applications

TEXT BOOKS:

1. Engineering Principles of Ground Modification, Haussmann M.R., McGraw-Hill International Edition (1990).
2. Ground Improvement Techniques, Dr.P. Purushotham Raj. Laxmi Publications, New Delhi University science press, New Delhi 2nd edition 2016

REFERENCE BOOKS:

1. Ground Improvement, Moseley M.P. Blackie Academic and Professional, Boca Taton, Florida, USA (1993).
2. Ground Improvement Techniques, NiharRanajanPatraVikas Publications, New Delhi
3. Ground Control and Improvement, Xanthakos P.P, Abramson, L.W andBrucwe, D.A (1994) John Wiley and Sons, New York, USA.

Online Learning Resources:

<https://archive.nptel.ac.in/courses/105/108/105108075/>
<https://archive.nptel.ac.in/courses/105/105/105105210/>



CIVIL ENGINEERING														
IV B. Tech – I Semester														
Course Code	SUBSURFACE INVESTIGATION AND INSTRUMENTATION Professional Elective-V									L	T	P	C	
23A101403b										3	0	0	3	
Course Objectives: The objectives of this course are to make the student to:														
1. Understand the fundamental concepts of soil formation, classification, and stratification processes.														
2. Analyze various soil exploration methods, including boring, drilling, and sampling techniques.														
3. Evaluate borehole logging methods and groundwater observations for site investigation.														
4. Apply field testing techniques such as SPT, PLT, PMT, CPT, and geophysical methods to assess soil properties.														
5. Assess soil exploration report preparation, including instrumentation and data interpretation.														
Course Outcomes (COs): After successful completion of this course, students will be able to:														
1. Explain soil formation processes, classification methods, and stratification phenomena.														
2. Analyze soil exploration methods and sampling techniques for various geotechnical applications.														
3. Evaluate borehole logging, groundwater observations, and their influence on soil properties.														
4. Apply field testing procedures, including penetration tests and geophysical methods, to assess subsurface conditions.														
5. Assess soil exploration report writing and field instrumentation techniques for site investigations.														
CO – PO Articulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	2	1	2	1	2	2	1	-	2	-	2	2	2
CO -2	3	3	2	3	2	2	3	1	-	2	-	2	2	2
CO -3	3	3	3	3	3	2	3	2	-	2	-	2	3	3
CO -4	3	2	3	3	3	3	3	2	-	2	2	2	3	3
CO -5	3	3	3	3	3	3	3	2	-	2	2	2	3	3
UNIT – I														
Introduction: Soil formation, Types of Soils, Physical and Chemical Weathering, Soil Transport, Deposition and Stratification Phenomena and Soil Classification.														
UNIT – II														
Methods of Soil Exploration: Methods of Boring, Auguring and Drilling. Machinery Used for Drilling, Types of Augers and Their Usage for Various Projects. Soil Sampling: Sampling Methods, Types of Samples, Storage of Samples and Their Transport. Sample Preparation, Sample Sizes, Types of Samplers ‘s Specifications for Testing.														
UNIT – III														
Borehole Logging: Logging of Boreholes - Logging Methods - Groundwater Observations – Water Table Fluctuations and Effects - Preparation of Soil Profiles and Exploration Report.														
UNIT – IV														



Field Testing of Soils: Methods and Specifications – Visual Identification Tests, Standard Penetration Test (SPT), Plate Load Test (PLT), Pressure Meter 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.

UNIT – V

Report Writing: Soil Exploration Reports- Identification, Calculations and Preparation. Field Instrumentation: Strain Gauges, Piezometer, Pressure Cells, Inclinometers, Proving Ring, Load Cells, Displacement Gauges

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Basic and Applied Soil Mechanics- A.S. Rao andGopalRanjan, New Age International.
2. IS:1892-Code of Practice for subsurface investigation for foundation, 1979
3. IS: SP36 Part 1-Compendium of India Standards on Soil Engineering-Laboratory Testing of Soils for Civil Engineering Purposes, 1987.
4. IS: SP36 Part 2-Compendium of India Standards on Soil Engineering-Field Testing of Soils for Civil Engineering Purposes, 1988.

Online Learning Resources:

<https://archive.nptel.ac.in/courses/105/103/105103182/>
https://onlinecourses.nptel.ac.in/noc25_ce27/preview
https://onlinecourses.nptel.ac.in/noc22_ce81/preview



CIVIL ENGINEERING															
IV B. Tech – I Semester															
Course Code	TRANSPORTATION ECONOMICS Professional Elective-V										L	T	P	C	
23A101403c											3	0	0	3	
Course Objectives: The objectives of this course are to make the student to: 1. Understand the fundamentals of transportation project development and decision-making. 2. Analyze transportation costs, including agency and user costs. 3. Evaluate vehicle operating costs and traffic congestion economics. 4. Apply economic evaluation methods for transportation projects. 5. Assess financing methods and risk analysis in transportation projects.															
Course Outcomes (COs): Upon successful completion of the course, students will be able to: 1. Describe the overall process of transportation project development and financial planning. 2. Analyze transportation cost structures, including demand and supply elasticity. 3. Evaluate vehicle operating costs and traffic congestion pricing strategies. 4. Apply economic analysis techniques to assess the feasibility of transportation projects. 5. Assess financial models, PPP strategies, and risk analysis for road projects.															
CO – PO Articulation Matrix															
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	
CO -1	3	2	2	1	2	-	-	-	-	2	-	2	2	2	
CO -2	3	3	3	3	3	-	-	-	-	2	-	2	3	2	
CO -3	3	3	3	3	2	-	-	-	-	2	-	2	3	3	
CO -4	3	3	3	3	2	-	-	-	-	2	-	2	3	3	
CO -5	3	3	3	3	3	3	3	3	-	2	-	2	3	3	
UNIT – I															
Introductory Concepts in Transportation Decision Making: Overall Transportation Project Development, Budgeting, Financial Planning, The Process of Transportation Project Development, Models Associated with Transportation Impact Evaluation Professional Ethics.															
UNIT – II															
Transportation Costs - Classification of Transportation Costs, Transportation Agency Costs, Transportation User Costs, General Structure and Behavior of Cost Functions and Road Pricing. Estimating Transportation Demand and Supply - Supply Equilibration, Dynamics of Transportation Demand and Supply, Elasticity of Travel Demand and Supply, Classification of Elasticity															
UNIT – III															
Vehicle Operating Costs: Fuel Costs - Maintenance and Spares, Depreciation - Crew Costs - Value of Travel Time Savings - Accident Costs. Economics of Traffic Congestion - Pricing Policy															
UNIT – IV															
Economic Analysis of Projects - Methods of Evaluation - Cost-Benefit Ratio, First Year Rate of Return, Net Present Value, and Internal-Rate of Return Methods; Indirect Costs and Benefits of Transport Projects															
UNIT – V															
Financing of Road Projects - Methods – Private Public Partnership (PPP) - toll Collection - Economic Viability of Design-Build-Operate-Transfer Schemes – Risk Analysis – Value for Money Analysis - Case Studies.															
TEXT BOOKS:															



1. Winfrey, Economic analysis for Highways, International Textbook Company, Pennsylvania, 1969.
2. Sarkar, P. K., and Maitri, V., Economics in Highway and Transportation Planning, Standard Publisher, New Delhi, 2010.

REFERENCE BOOKS:

1. IRC, Manual on Economic Evaluation of Highway Projects in India, SP30, 2007
2. David, H., and Brewer, A., Transport: An Economics and Management Perspective. Oxford University Press, UK, 2000.
3. Quinet, E., and Vickerman, R., Principles of Transport Economics, Edward Elgar Pub, 2005
4. Button, K. J., Transport Economics, Elgar, 2010

Online Learning Resources:

<https://archive.nptel.ac.in/courses/105/104/105104098/>
<https://archive.nptel.ac.in/content/storage2/courses/105101087/01-Ltexhtml/p2/p.html>



CIVIL ENGINEERING														
IV B.Tech – I Semester														
Course Code	Skill oriented course									L	T	P	C	
	Skills in Civil Engineering software. (STAADPRO/CAD/TEKLA)													
23A101406										0	1	2	2	
Course Objectives The objectives of this course are to:														
1. Provide fundamental knowledge of Auto CAD and Tekla for 2D drafting and 3D modeling.														
2. Train students in structural analysis and design using STAAD.Pro														
3. Develop skills in reinforcement detailing and structural component modeling .														
4. Introduce seismic and nonlinear analysis for structural safety evaluation.														
5. Enable students to apply civil engineering software tools for real-world projects.														
Course Outcomes (COs): Upon successful completion of this course, students will be able to:														
1. Create 2D drawings and structural detailing using AutoCAD .														
2. Develop 3D building models and analyze site to pography in Revit .														
3. Perform structural analysis and design of multi-story buildings using STAAD.Pro and ETABS .														
4. Conduct seismic and performance-based analysis for high-rise structures.														
5. Apply SAP2000 for bridge modeling, water tank design, and advanced structural systems .														
CO – PO Articulation Matrix														
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO -1	3	1	1	-	2	-	-	1	-	1	1	1	2	1
CO -2	3	1	2	-	3	-	-	2	-	2	2	2	1	1
CO -3	3	1	2	-	3	-	-	2	-	2	2	2	2	2
CO -4	3	1	1	-	3	-	-	1	-	1	1	1	1	2
CO -5	3	1	1	-	3	-	-	1	-	1	1	1	1	1
List of Experiments: -														
1. Determination of Basic Drawing and Editing Commands in AutoCAD														
2. Creation of a 2D Floor Plan for a Residential Building in AutoCAD														
3. Development of Structural Detailing for Beams and Columns in AutoCAD														
4. Application of Reinforcement Detailing for Slabs and Footings in AutoCAD														
5. Creation and analysis of a steel column using TEKLA														
6. Modelling a Roof Truss by TEKLA														
7. Design of a Composite Beam by TEKLA														
8. Column Base Plate Design by TEKLA														
9. Determination of STAAD.Pro Interface and Structural Model Setup														
10. Analysis and Design of a Simply Supported Beam in STAAD.Pro														
11. Development of Structural Analysis for a Multi-Story RCC Building in STAAD.Pro														
12. Application of Seismic Load Analysis on a Building Structure in STAAD.Pro														
TEXT BOOKS:														



1. George Omura, Brian C. Benton – Mastering AutoCAD 2025 and AutoCAD LT 2025, Wiley, 2025 Edition
2. TEKLA Structural Designer 2023 Engineers Hand Book by Trimble Solutions Corporation

REFERENCE BOOKS:

1. Phil Read, Eddy Krygiel, James Vandezande – BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, and Contractors, John Wiley & Sons, 4th Edition, 2023
2. NighatYasmin Ph.D., Introduction to AutoCAD 2025 for Civil Engineering Applications, SDC Publications, 2024 Edition.



Course Code 23A100059	Audit Course GENDER SENSITIZATION (Common to All Branches of Engineering)	L	T	P	C
		0	0	2	0

Course Objectives:

- To enable students to understand the gender related issues, vulnerability of women and men
- To familiarize them about constitutional safeguard for gender equality
- To expose the students to debates on the politics and economics of work
- To help students reflect critically on gender violence
- To make them understand that gender identities and gender relations are part of culture as they shape the way daily life is lived in the family as well as wider community and the workplace.

Course Outcomes (CO):

COs	Statements	Blooms level
CO1	Understand the basic concepts of gender and its related terminology	L1, L2,
CO2	Identify the biological, sociological, psychological and legal aspects of gender.	L1, L2
CO3	Use the knowledge in understanding how gender discrimination works in our society and how to counter it.	L3
CO4	Analyze the gendered division of labour and its relation to politics and economics.	L4
CO5	Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups	L5
CO6	Develop students' sensibility with regard to issues of gender in contemporary India	L3

Unit-1 UNDERSTANDING GENDER Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit-2 GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio- Demographic Consequences-Gender Spectrum -

Unit-3 GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- —My Mother doesn't Work. —Share the Load -Work: Its Politics and Economics -Fact and Fiction- Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit-4 GENDER-BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence

Unit-5 GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular



Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language- Just Relationships **Prescribed Books**

1. A. Suneetha, Uma Bhrugubanda, et al. *Towards a World of Equals: A Bilingual Textbook on Gender*, Telugu Akademi, Telangana, 2015.
2. Butler, Judith. *Gender Trouble: Feminism and the Subversion of Identity*. UK Paperback Edn. March 1990

Reference Books

1. Wtatt, Robin and Massood, Nazia, *Broken Mirrors: The dowry Problems in India*, London: Sage Publications, 2011
2. Datt, R. and Kornberg, J.(eds), *Women in Developing Countries, Assessing Strategies for Empowerment*, London: Lynne Rienner Publishers, 2002
3. Brush, Lisa D., *Gender and Governance*, New Delhi, Rawat Publication, 2007
4. Singh, Direeti, *Women and Politics World Wide*, New Delhi, Axis Publications, 2010
5. Raj Pal Singh, Anupama Sihag, *Gender Sensitization: Issues and Challenges* (English, Hardcover), Raj Publications, 2019
6. A.Revathy& Murali, Nandini, *A Life in Trans Activism*(Lakshmi Narayan Tripathi). The University of Chicago Press, 2016

Online Resources:

1. Understanding Gender chrome-extension:
//kdpelmjpfafjppnhblofcjpeomlnpah/https://www.arvindguptatoys.com/arvindgupta/kamla-gender1.pdf https://onlinecourses.swayam2.ac.in/nou24_hs53/preview
2. Gender Roles and Relations
<https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes> <https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408> https://onlinecourses.swayam2.ac.in/cec23_hs29/preview
3. Gender and Labour
<https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed> https://onlinecourses.nptel.ac.in/noc23_mg67/preview
4. **GENDER-BASED VIOLENCE**
https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en <https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls> https://onlinecourses.swayam2.ac.in/nou25_ge38/preview
5. **GENDER AND CULTURE**
<https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/>
<https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/>
<https://archive.nptel.ac.in/courses/109/106/109106136/>
Abdulali Sohaila. Fought For My Life...and Won. Available online (at:
<http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/>



OPEN ELECTIVES



IV B.Tech I Sem

Course Code	EMPLOYABILITY SKILLS	L	T	P	C
23A100053	OPEN ELECTIVE-III	3	0	0	3
Course Objectives:					
- To encourage all round development of the students by focusing on productive skills - To make the students aware of Goal setting and writing skills - To enable them to know the importance of presentation skills in achieving desired goals. - To help them develop organizational skills through group activities To function effectively with heterogeneous teams					
Course Outcomes (CO):		Blooms Level			
CO1: Understand the importance of goals and try to achieve them		L1, L2			
CO2: Explain the significance of self-management		L1, L2			
CO3: Apply the knowledge of writing skills in preparing eye-catching resumes		L3			
CO4: Analyse various forms of Presentation skills		L4			
CO5: Judge the group behaviour appropriately		L5			
CO6: Develop skills required for employability.		L3, L6			
UNIT - I	Goal Setting and Self-Management				
Definition, importance, types of Goal Setting – SMART Goal Setting – Advantages- Motivation – Intrinsic and Extrinsic Motivation – Self-Management - Knowing about self – SWOC Analysis.					
UNIT - II	Writing Skills				
Definition, significance, types of writing skills – Resume writing Vs CV Writing - E-Mail writing, Cover Letters - E-Mail Etiquette -SoP (Statement of Purpose).					
UNIT - III	Technical Presentation Skills				
Nature, meaning & significance of Presentation Skills – Planning, Preparation, Presentation, Stage Dynamics –Anxiety in Public speaking (Glossophobia)- PPT & Poster Presentation .					
UNIT - IV	Group Presentation Skills				
Body Language – Group Behaviour - Team Dynamics – Leadership Skills – Personality Manifestation-Group Discussion-Debate –Corporate Etiquette.					
UNIT - V	Job Cracking Skills				
Nature, characteristics, importance & types of Interviews – Job Interviews – Skills for success – Job searching skills - STAR method - FAQs- Answering Strategies – Mock Interviews.					
Textbooks:					
1. Sabina Pillai, Agna Fernandez. <i>Soft Skills & Employability Skills</i> ,2014.Cambridge Publisher.					
2. Alka Wadkar. <i>Life Skills for Success</i> , Sage Publications, 2016.					
Reference Books:					
1. Gangadhar Joshi . Campus to Corporate Paperback ,Sage Publications. 2015					
2. Sherfield Montgomery Moody ,Cornerstone Developing Soft Skills, Pearson Publications. 4 Ed. 2008					
3. Shikha Kapoor. Personality Development and Soft Skills - Preparing for Tomorrow .1 Edition, Wiley, 2017.					
4. M. Sen Gupta, Skills for Employability, Innovative Publication, 2019.					
5. Steve Duck and David T McMahan, The Basics f Communication Skills A Relational Perspective, Sage press, 2012.					



Online Learning Resources:

1. <https://youtu.be/gkLsn4ddmTs>
2. <https://youtu.be/2bf9K2rRWwo>
3. <https://youtu.be/FchfE3c2jzc>
4. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgi7KLJ
5. <https://www.youtube.com/c/skillopedia/videos>
6. https://onlinecourses.nptel.ac.in/noc25_hs96/preview
7. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
8. <https://archive.nptel.ac.in/courses/109/107/109107172/#>
9. <https://archive.nptel.ac.in/courses/109/104/109104107/>



IV B.Tech I Sem

Course Code	ELECTRIC VEHICLES	L	T	P	C
23A102408	OPEN ELECTIVE-IV	3	0	0	3

Course Objectives: To make the student

- Remember and understand the differences between conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.
- Analyze various EV configurations, parameters of EV systems and Electric vehicle dynamics.
- Analyze the basic construction, operation and characteristics of fuel cells and battery charging techniques in HEV systems.
- Design and analyze the various control structures for Electric vehicle.

Course Outcomes (CO): Student will be able to

CO 1: To understand and differentiate between Conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs. -L2

CO 2: Understand Various dynamics of Electric Vehicles. -L2

CO3: To remember and understand various configurations in parameters of EV system and dynamic aspects of EV. -L1

CO 4: To analyze fuel cell technologies in EV and HEV systems. L3

CO 5: To analyze the battery charging and controls required of EVs. -L3

UNIT I Introduction to EV Systems and Energy Sources:

Past, Present and Future of EV - EV Concept- EV Technology- State-of-the Art of EVs- EV configuration- EV system- Fixed and Variable gearing- Single and multiple motor drive- In-wheel drives- EV parameters: Weight, size, force and energy, performance parameters. Electro mobility and the environment- History of Electric power trains- Carbon emissions from fuels- Green houses and pollutants- Comparison of conventional, battery, hybrid and fuel cell electric systems.

UNIT II EV Propulsion and Dynamics:

Choice of electric propulsion system- Block diagram- Concept of EV Motors- Single and multi-motor configurations- Fixed and variable geared transmission- In-wheel motor configuration-Classification - Electric motors used in current vehicle applications - Recent EV Motors- Vehicle load factors- Vehicle acceleration.

UNIT III Fuel Cells:

Introduction of fuel cells- Basic operation- Model - Voltage, power and efficiency- Power plant system – Characteristics- Sizing - Example of fuel cell electric vehicle - Introduction to HEV- Brake specific fuel consumption - Comparison of Series-Parallel hybrid systems- Examples.

UNIT IV Battery Charging and Control:

Battery charging: Basic requirements- Charger architecture- Charger functions- Wireless charging-Power factor correction.

Control: Introduction- Modeling of electro mechanical system- Feedback controller design approach-PI controller's designing- Torque-loop, Speed control loop compensation- Acceleration of battery electric vehicle.

UNIT V Energy Storage Technologies:

Role of Energy Storage Systems- Thermal- Mechanical-Chemical- Electrochemical- Electrical - Efficiency of energy storage systems- Super capacitors-Superconducting Magnetic Energy Storage (SMES)- SOC- SoH -fuel cells - G2V- V2G- Energy storage in Micro-grid and Smart grid- Energy Management with storage systems- Battery SCADA



Textbooks:

- 1.C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001,1st Edition
- 2.Ali Emadi, —Advanced Electric Drive Vehicles, CRC Press, 2017,1st Edition

Reference Books:

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2021, 3rd Edition.
2. Francisco Díaz-González, Andreas Sumper, Oriol Gomis-Bellmunt, Energy Storage in Power Systems, Wiley Publication, ISBN: 978-1-118-97130-7, Mar 2016,1st Edition
3. A.G.Ter-Gazarian, —Energy Storage for Power Systems, the Institution of Engineering and Technology (IET) Publication, UK, (ISBN – 978-1-84919-219-4), Second Edition, 2011.
4. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, —Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004,1st Edition
5. James Larminie, John Lowry, —Electric Vehicle Technology Explained, Wiley, 2003,2nd Edition.

Online Learning Resources:

1. <https://nptel.ac.in/courses/108/102/108102121/>
2. <https://nptel.ac.in/syllabus/108103009>