R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY-PUTTUR
(AUTONOMOUS)

DEPARTMENT OF CIVIL ENGINEERING

INDUCTION PROGRAMME

S.No	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga And Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation To All Branches -- Career Options, Tools, Etc.	MC	3-0-0-0
4	Orientation On Admitted Branch -- Corresponding Labs, Tools And Platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment On Basic Aptitude And Mathematical Skills	MC	2-0-3-0
7	Remedial Training In Foundation Courses	MC	2-1-2-0
8	Remedial Training In Foundation Courses	MC	3-0-0-0
9	Communication Skills -- Focus On Listening, Speaking, Reading, Writing Skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

R23 **B.Tech-CE**

I B.Tech – I Sem.

S.No.	Category	Subject Code	Title	L/D	T	P	Credits
1	BS&H	23HS0810	Communicative English	2	0	0	2
2	BS&H	23HS0803	Engineering Chemistry	3	0	0	3
3	BS&H	23HS0830	Linear Algebra & Calculus	3	0	0	3
4	Engineering Science	23CE0101	Basic Civil & Mechanical Engineering	3	0	0	3
5	Engineering Science	23CS0501	Introduction to Programming	3	0	0	3
6	BS&H	23HS0811	Communicative English Lab	0	0	2	1
7	BS&H	23HS0804	Engineering Chemistry Lab	0	0	2	1
8	Engineering Science	23ME0301	Engineering Workshop	0	0	3	1.5
9	Engineering Science	23CS0502	Computer Programming Lab	0	0	3	1.5
10	BS&H	23HS0813	Health and wellness, Yoga and Sports	-	-	1	0.5
Total				**14**	**0**	**11**	**19.5**

I B.Tech – II Sem.

S.No.	Category	Subject Code	Title	L/D	T	P	Credits
1	BS&H	23HS0840	Engineering Physics	3	0	0	3
2	BS&H	23HS0831	Differential Equations & Vector Calculus	3	0	0	3
3	Engineering Science	23EE0201	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	23ME0302	Engineering Graphics	1	0	4	3
5	Engineering Science	23CS0503	IT Workshop	0	0	2	1
6	Professional Core	23CE0102	Engineering Mechanics	3	0	0	3
7	BS&H	23HS0841	Engineering Physics Lab	0	0	2	1
8	Engineering Science	23EE0202	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	Professional Core	23CE0103	Engineering Mechanics & Building Practices Lab	0	0	3	1.5
10	BS&H	23HS0812	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total				**13**	**0**	**15**	**20.5**

II B.Tech – I Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23HS0832	Numerical and Statistical Methods	3	0	0	3
2	23HS0841	Universal Human Values – Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	23CE0105	Surveying	3	0	0	3
4	23CE0106	Strength of Materials	3	0	0	3
5	23CE0107	Fluid Mechanics	3	0	0	3
6	23CE0108	Surveying Lab	0	0	3	1.5
7	23CE0109	Strength of Materials Lab	0	0	3	1.5
8	23CE0110	Building Planning and Drawing	0	1	2	2
9	23HS0805	Environmental Science	2	0	0	0
Total			**16**	**2**	**8**	**20**

II B.Tech – II Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23HS0848 23HS0850 23HS0851	**Humanities Elective-I** 1. Managerial Economics and Financial Analysis 2. Organizational Behaviour 3. Business Environment	2	0	0	2
2	23CE0111	Engineering Geology	3	0	0	3
3	23CE0112	Concrete Technology	3	0	0	3
4	23CE0113	Structural Analysis	3	0	0	3
5	23CE0114	Hydraulics & Hydraulic Machinery	3	0	0	3
6	23CE0115	Concrete Technology Lab	0	0	3	1.5
7	23CE0116	Engineering Geology lab	0	0	3	1.5
8	23HS0818	Soft Skills	0	1	2	2
9	23HS0815	Design Thinking & Innovation	1	0	2	2
Total			**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation						

III B.Tech – I Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23CE0117	Water Resources Engineering	3	0	0	3
2	23CE0118	Design of Reinforced Concrete Structures	3	0	0	3
3	23CE0119	Geotechnical Engineering	3	0	0	3
4	23CS0519	Introduction to Quantum Technologies and Applications	3	0	0	3
5	23CE0120 23CE0121 23CE0155	**Professional Elective-I** 1. Pre-stressed Concrete 2. Air Pollution and Control 3. Environmental Impact Assessment	3	0	0	3
6		**Open Elective-I**	3	0	0	3
7	23CE0122	Geotechnical Engineering Lab	0	0	3	1.5
8	23CE0123	Fluid Mechanics and Hydraulic Machines Lab	0	0	3	1.5
9	23CE0124	**Skill oriented course** Estimation, Specifications, Costing & Valuation	0	1	2	2
10	23EC0417	Tinkering Lab	0	0	2	1
11	23CE0145	Evaluation of Community Service Internship	-	-	-	2
Total			**18**	**1**	**10**	**26**

Open Elective-I

S.No.	Subject Code	Title	Offered by the Dept.
1	23EE0261	Electrical Safety Practices and Standards	EEE
2	23ME0356	Sustainable Energy Technologies	ME
3	23EC0406	Electronic Circuits	ECE
4	23CS0553	Java Programming	CSE & Allied/IT
5	23CS0554	Fundamentals of Artificial Intelligence	
6	23CS0555	Quantum Technologies and Applications	
7	23HS0855	Mathematics for Machine Learning and AI	Mathematics
8	23HS0842	Materials Characterization Techniques	Physics
9	23HS0806	Chemistry of Energy Systems	Chemistry
10	23HS0821	English for Competitive Examinations	Humanities
11	23HS0822	Entrepreneurship and New Venture Creation	

III B.Tech – II Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23CE0125	Design of Steel Structures	3	0	0	3
2	23CE0126	Highway Engineering	3	0	0	3
3	23CE0127	Environmental Engineering	3	0	0	3
4	23CE0128 23CE0129 23CE0130	**Professional Elective-II** 1. Design of Earthquake Resistant Structures 2. Open Channel Flow 3. Foundation Engineering	3	0	0	3
5	23CE0131 23CE0132 23CE0133	**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	23CE0134	Highway Engineering Lab	0	0	3	1.5
8	23CE0135	Environmental Engineering Lab	0	0	3	1.5
9	23CE0136	**Skill oriented course** Building Information Modelling	0	1	2	2
10	23HS0816	**Mandatory noncredit course** Technical paper writing & IPR	2	0	0	-
Total			**20**	**1**	**8**	**23**

Mandatory Industry Internship of 08 weeks duration during summer vacation

Open Elective-II

S.No.	Subject Code	Title	Offered by the Dept.
1	23EE0262	Renewable Energy Sources	EEE
2	23ME0349	Automation and Robotics	ME
3	23EC0441	Digital Electronics	ECE
4	23CS0511	Operating Systems	CSE& Allied/IT
5	23CS0556	Introduction to Machine Learning	
6	23HS0853	Optimization Techniques in Engineering	Mathematics
7	23HS0858	Mathematical Foundation of Quantum Technologies	
8	23HS0843	Physics of Electronic Materials and Devices	Physics
9	23HS0807	Chemistry of Polymers and Applications	Chemistry
10	23HS0823	Academic Writing and Public Speaking	Humanities

IV B.Tech – I Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23CE0137	Finite Element Methods	3	0	0	3
2	23HS0861 23HS0862 23HS0863	**Management Course-II** 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	2	0	0	2
3	23CE0138 23CE0139 23CE0140	**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	23CE0141 23CE0142 23CE0143	**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	23CE0144	**Skill oriented course** Skills in Civil Engineering Software (STAADPRO/CAD/TEKLA)	0	1	2	2
8	23HS0820	**Audit Course** Gender Sensitization	2	0	0	-
9	23CE0146	Evaluation of Industry Internship	-	-	-	2
Total			**19**	**1**	**2**	**21**

Open Elective-III

S.No.	Subject Code	Title	Offered by the Dept.
1	23EE0263	Smart Grid Technologies	EEE
2	23ME0357	3D Printing Technologies	ME
3	23EC0414	Microprocessors and Microcontrollers	ECE
4	23CS0512	Data Base Management Systems	CSE & Allied/IT
5	23CS0536	Cyber Security	
6	23HS0856	Wavelet Transforms and its Applications	Mathematics
7	23HS0844	Smart Materials and Devices	Physics
8	23HS0846	Introduction to Quantum Mechanics	
9	23HS0808	Green Chemistry and Catalysis for Sustainable Environment	Chemistry
10	23HS0824	Employability Skills	Humanities

Open Elective-IV

S.No.	Subject Code	Title	Offered by the Dept.
1	23EE0264	Electric Vehicles	EEE
2	23ME0351	Total Quality Management	ME
3	23EC0442	Transducers and Sensors	ECE
4	23CS0558	Introduction to Computer Networks	CSE & Allied/IT
5	23CS0545	Internet of Things	
6	23CS0557	Introduction to Quantum Computing	
7	23HS0857	Financial Mathematics	Mathematics
8	23HS0845	Sensors and Actuators for Engineering Applications	Physics
9	23HS0809	Chemistry of Nano materials and Applications	Chemistry
10	23HS0825	Literary Vibes	Humanities

IV B.Tech – II Sem.

S.No.	Subject Code	Title	L/D	T	P	Credits
1	23CE0147	Internship	-	-	-	4
2	23CE0148	Project	-	-	-	8
Total						12

COURSES OFFERED FOR HONOURS DEGREE IN CIVIL ENGINEERING

S.No.	Subject Code	Title	Contact Hours Per Week			Credits
			L/D	T	P	
1	23CE0160	Soil Dynamics and Machine Foundation	3	0	0	3
2	23CE0161	Industrial Waste and Waste Water Management	3	0	0	3
3	23CE0162	Repair & Rehabilitation of Structures	3	0	0	3
4	23CE0163	Design and Drawing of Irrigation Structures	3	0	0	3
5	23CE0164	Road Safety Engineering	3	0	0	3
6	23CE0165	NDT Lab	0	0	3	1.5
7	23CE0166	ETABS/SAP Lab	0	0	3	1.5
Total						**18**

LIST OF MINORS OFFERED BY THE CIVIL ENGINEERING

BUILDING PLANNING & CONSTRUCTION TECHNOLOGY

S.No.	Subject Code	Title	Contact Hours Per Week			Credits
			L/D	T	P	
1	23CE0170	Construction Materials	3	-	0	3
2	23CE0171	Construction Methods	3	-	0	3
3	23CE0110	Building Planning and Drawing	3	-	0	3
4	23CE0105	Surveying	3	-	0	3
5	23CE0112	Concrete Technology	3	-	0	3
6	23CE0115	Concrete Technology Lab	0	0	3	1.5
7	23CE0108	Surveying Lab	0	0	3	1.5
Total						**18**

LIST OF MINORS OFFERED TO CIVIL ENGINEERING

S.No.	Title	Offered by the Dept.
1	Micro Grid Technology	EEE
2	Energy Systems	
3	3D Printing	ME
4	Industrial Engineering	
5	Embedded Systems and IoT	ECE & VLSI
6	Electronic Systems	
7	Computer Science and Engineering	CSE & Allied
8	Cyber Security	
9	Internet of Things	
10	Data Science	
11	Artificial Intelligence & Machine Learning	
12	Data Analytics	
13	Data Science and Analytics	
14	Programming & Computational Intelligence	
15	AI Applications & Emerging Technologies	
16	Quantum Computing	
17	Quantum Technologies	

LIST OF OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING

S.NO	CODE	TITLE OF THE COURSE	CATEGORY OF THE COURSE
1	23CE0150	Green Buildings	OE - I
2	23CE0151	Construction Technology and Management	
3	23CE0152	Disaster Management	OE -II
4	23CE0153	Sustainability in Engineering Practices	
5	23CE0154	Building Materials and Services	OE - III
6	23CE0155	Environmental Impact Assessment	
7	23CE0156	Geo-Spatial Technologies	OE –IV
8	23CE0157	Solid Waste Management	

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B.Tech-CE

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I B.Tech – I Sem.

L	T	P	C
2	0	0	2

(23HS0810) COMMUNICATIVE ENGLISH
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand the context, topic, and pieces of specific information from social or Transactional dialogues*
2. *Apply grammatical structures to formulate sentences and correct word forms.*
3. *Analyse discourse markers to speak clearly on a specific topic in informal discussions.*
4. *Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.*
5. *Create a coherent paragraph, essay, and resume*
6. *Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.*

UNIT – I

Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT – II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary: Homonyms, Homophones, Homographs.

UNIT – III
Lesson: BIOGRAPHY: Elon Musk
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Note-making, paraphrasing
Grammar: Verbs - tenses; subject-verb agreement; Compound words,
Vocabulary: Collocations

UNIT – IV
Lesson: INSPIRATION: The Toys of Peace by Saki
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters, Resumes.
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary: Words often confused, Jargons

UNIT – V
Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension
Speaking: Formal oral presentations on topics from academic contexts
Reading: Reading comprehension.
Writing: Writing structured essays on specific topics.
Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)
Vocabulary: Technical Jargons

TEXT BOOKS
1. Pathfinder, *Communicative English for Undergraduate Students*, Orient Black Swan, 1st edition, 2023 (Units 1, 2 & 3)
2. *Empowering with Language* by Cengage Publications, 2023 (Units 4 & 5)

REFERENCES

1. Dubey, Sham Ji & Co. *English for Engineers*, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing, *A Handbook for International Students*, Routledge, 2014
3. Murphy, Raymond, *English Grammar in Use*, Cambridge University Press, Fourth edition, 2019.
4. Lewis, Norman, *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary*, Anchor, 2014.

WEB RESOURCES

GRAMMAR

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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B.Tech-CE

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(AUTONOMOUS)

I B.Tech – I Sem.

L	T	P	C
3	0	0	3

(23HS0803) ENGINEERING CHEMISTRY
(Common to Civil and Mechanical Branches)

COURSE OBJECTIVES

The objectives of this course is to

1. *Familiarize engineering chemistry and its applications*
2. *Impart the concept of soft and hard waters, softening methods of hard water*
3. *Train the students on the principles and applications of electrochemistry, polymers, surface chemistry and cement*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Develop the understanding of Technology involved in improving quality of water for its industrial use*
2. *Able to understand functioning of electrochemical energy systems, assess the reaction mechanism in Batteries, Fuel cells and Principles of corrosion and corrosion control*
3. *Impart knowledge on the essential aspects of Principles and comprehend idea about the synthesis and engineering applications of polymers*
4. *Understand the various types of fuels and combustion. Explain Calorific values, octane number, refining of petroleum and cracking of oils*
5. *Analyse and demonstrate the concepts of cement, refractories, lubricants, Composites and their applications of modern engineering materials in real world*
6. *Summarize the concepts of colloids, micelle and nanomaterials*

UNIT – I

Water Technology: Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes – desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT – II

Electrochemistry and Applications: Electrodes – electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT – III

Polymers and Fuel Chemistry: Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization -Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC Nylon 6,6 and Bakelite

Elastomers: Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

Fuels: Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT – IV

Modern Engineering Materials

Composites: Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories: Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants: Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials – Portland cement, constituents, setting and Hardening of cement

UNIT – V

Surface Chemistry and Nanomaterials: Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

TEXT BOOKS

1. Jain and Jain, *Engineering Chemistry*, Dhanpat Rai, 16th edition, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry*, Oxford University Press,10th edition, 2010.

REFERENCES

1. H.F.W. Taylor, *Cement Chemistry*, Thomas Telford Publications, 2nd edition, 1997.
2. D.J.Shaw, *Introduction to Colloids and Surface Chemistry*, Butterworth-Heineman, 1992.
3. Fred W. Billmayer Jr, Textbook of Polymer Science, 3rd edition

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I B.Tech – I Sem.

L	T	P	C
3	0	0	3

(23HS0830) LINEAR ALGEBRA & CALCULUS
(Common to Civil and Mechanical Branches)

COURSE OBJECTIVES

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to

1. *Develop and use of matrix algebra techniques that are needed by engineers for practical applications.*
2. *Identify different matrix techniques to find the inverse and powers of the matrix*
3. *Understanding the concepts of continuity and differentiability of functions defined on intervals*
4. *Estimate the series expansions of algebraic and transcendental functions.*
5. *Analyse the functions of several variables which is useful in optimization.*
6. *Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.*

UNIT – I

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof) - Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods

UNIT–II

Eigen Values, Eigenvectors and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT – III

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT – IV

Partial Differentiation and Applications (Multi Variable Calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule,

Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers

UNIT – V

Multiple Integrals (Multi Variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals)

TEXT BOOKS

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th edition, 2017
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 10th edition, 2018,

REFERENCES

1. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus*, Pearson Publishers, 14th edition, 2018.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 5th edition (9th reprint), 2021.
3. Glyn James, *Advanced Modern Engineering Mathematics*, Pearson publishers, 5th edition, 2018.
4. Micheael Greenberg, *Advanced Engineering Mathematics*, Pearson publishers, 9th edition
5. H. K Das, Er. Rajnish Verma, *Higher Engineering Mathematics*, S. Chand Publications, Third edition (Reprint 2021), 2014

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I B.Tech – I Sem.

L	T	P	C
3	0	0	3

(23CE0101) BASIC CIVIL & MECHANICAL ENGINEERING
(Common to all branches of Engineering)

PART A: BASIC CIVIL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *Get familiarized with the scope and importance of Civil Engineering sub-divisions.*
2. *Introduce the preliminary concepts of surveying.*
3. *Acquire preliminary knowledge on Transportation and its importance in nation's economy.*
4. *Get familiarized with the importance of quality, conveyance and storage of water*
5. *Introduction to basic civil engineering materials and construction techniques.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.*
2. *Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.*
3. *Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and understand the process of water storage and its supply to the public.*

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society - Various Disciplines of Civil Engineering - Structural Engineering - Geo-technical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering - Scope of each discipline - Building Construction and Planning - Construction Materials - Cement - Aggregate - Bricks - Cement concrete - Steel. Introduction to Prefabricated construction Techniques

UNIT II

Surveying: Objectives of Surveying - Horizontal Measurements - Angular Measurements - Introduction to Bearings - Levelling instruments used for levelling - Simple problems on levelling and bearings - Contour mapping.

UNIT III

Transportation Engineering: Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water - Quality of water - Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

TEXT BOOKS

1. M.S.Palanisamy, *Basic Civil Engineering,* Tata McGraw Hill Publications (India) Pvt. Ltd. Fourth edition, 2011.
2. S.S. Bhavikatti, *Introduction to Civil Engineering,* New Age International Publishers, First edition, 2022.
3. Satheesh Gopi, *Basic Civil Engineering*, Pearson Publications, First edition, 2009

REFERENCES

1. S.K. Duggal, *Surveying, Vol- I and Vol-II,* Tata McGraw Hill Publishers, Fifth edition, 2019
2. Santosh Kumar Garg, *Hydrology and Water Resources Engineering,* Khanna Publishers, Delhi, 2016
3. Santosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Delhi, 38th edition, 2023
4. S.K.Khanna, C.E.G. Justo and Veeraraghavan, *Highway Engineering*, Nem Chand and Brothers Publications, 10th edition, 2019
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES

The students after completing the course are expected to

1. *Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.*
2. *Explain different engineering materials and different manufacturing processes.*
3. *Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.*

COURSE OUTCOMES (COs)

On completion of the course, the student should be able to

1. *Understand the role of mechanical engineering and materials in the manufacturing and automotive industries*
2. *Explain the basics of manufacturing processes and thermal engineering and its applications.*
3. *Describe the working of different power plants, Mechanical power transmission systems and the applications of robotics in industrial sector*

UNIT-I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society - Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace and Marine sectors.

Engineering Materials: Metals - Ferrous and Non-ferrous, Ceramics, Composites, Smart materials

UNIT-II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing and Smart manufacturing.

Thermal Engineering: Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines,

Components of Electric and Hybrid Vehicles.

UNIT-III

Power Plants: Working principle of Steam, Diesel, Hydro, Nuclear power plants

Mechanical Power Transmission: Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics: Joints & links, configurations and applications of robotics

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

TEXT BOOKS

1. V.Ganesan, *Internal Combustion Engines*, Tata McGraw Hill Publications (India) Pvt. Ltd.
2. S.S.Rattan, A *Text book of Theory of Machines*, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. Jonathan Wicker and Kemper Lewis, *An introduction to Mechanical Engineering,* Cengage learning India Pvt. Ltd.

REFERENCES

1. Appuu Kuttan KK, *Robotics*, I.K. International Publishing House Pvt. Ltd. Volume-I
2. L.Jyothish Kumar, Pulak M Pandey, *3D printing & Additive Manufacturing Technology*, Springer Publications
3. Mahesh M Rathore, *Thermal Engineering,* Tata McGraw Hill Publications (India) Pvt. Ltd.
4. G.Shanmugam and M.S.Palanisamy, *Basic Civil and Mechanical Engineering*, Tata McGraw Hill Publications (India) Pvt. Ltd.

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B.Tech – I Sem.

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(23CS0501) INTRODUCTION TO PROGRAMMING
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce students to the fundamentals of computer programming.*
2. *To provide hands-on experience with coding and debugging.*
3. *To foster logical thinking and problem-solving skills using programming.*
4. *To familiarize students with programming concepts such as data types, control structures, functions, and arrays.*
5. *To encourage collaborative learning and teamwork in coding projects.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand basics of computers, the concept of algorithm and algorithmic thinking.*
2. *Analyse a problem and develop an algorithm using control structures & arrays*
3. *Analyse a problem and develop an algorithm to solve it using strings*
4. *Understand and implement the problems using pointers*
5. *Apply modular approach for solving the problem*
6. *Design and implement problem-solving using structures, unions and files.*

UNIT-I

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting-Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT - II

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do while) Break and Continue.

UNIT - III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT - IV

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT - V

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, Prentice Hall, 1988
2. Pradip Dey Manas Ghosh" *Programming in C* ", Oxford University Press, First edition, 2018.

REFERENCES

1. Balagurusamy, E, *Computing fundamentals and C Programming*, McGraw-Hill Education, 2008.
2. Rema Theraja, *Programming in C*, Oxford, 2nd edition, 2016
3. Forouzan, Gilberg, Prasad, *C Programming, A Problem Solving Approach*, CENGAGE, 3rd edition

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(23HS0811) COMMUNICATIVE ENGLISH LAB
(Common to all branches)

COURSE OBJECTIVES

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.*
4 *Evaluate and exhibit professionalism in participating in debates and group discussions.*
5 *Become active participants in the learning process and acquire proficiency in spoken English.*
6. *Speak with clarity and confidence thereby enhances employability skills*

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Player Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions- Methods & practice
8. Debates-Methods & Practice
9. PPT Presentations/Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Info tech
- Young India Films

REFERENCES

1. Raman Meenakshi, Sangeeta-Sharma, *Technical Communication*, Oxford Press, 2018.
2. Taylor Grant:, *English Conversation Practice*, Tata McGraw Hill Education India, 2016
3. Hewing's, Martin. Cambridge, *Academic English* (B2).CUP, 2012.
4. J.Sethi & P.V.Dhamija, *A Course in Phonetics and Spoken English*, (2nd Ed), Kindle, 2013

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I B. Tech – I Sem.

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(23HS0804) ENGINEERING CHEMISTRY LAB
(Common to Civil and Mechanical Branches)

COURSE OBJECTIVES

The objectives of this course

1. To verify the fundamental concepts with experiments

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. Estimate the ions present in domestic/industry waste water.
2. Calculate strength of acid in Pb-Acid battery.
3. Prepare advanced polymer materials.
4. Determine the physical properties like surface tension, adsorption and viscosity
5. Estimate the Iron and Calcium in cement.
6. Calculate the hardness of water.

LIST OF EXPERIMENTS

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Determination of Strength of an acid in Pb-Acid battery.
4. Preparation of a polymer (Bakelite).
5. Determination of percentage of Iron in Cement sample by Colorimetry.
6. Estimation of Calcium in port land Cement.
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal.
9. Determination of percentage Moisture content in a coal sample.
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.
12. Determination of Calorific value of gases by Junker's gas Calorimeter.

Any Ten experiments may be conducted

REFERENCES

1. R.C. Denney, J.D. Barnes and B. Sivasankar, *Vogel's Quantitative Chemical Analysis*, Pearson Publications, 6th edition by J. Mendham

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(23ME0301) ENGINEERING WORKSHOP
(Common to all **branches)**

COURSE OBJECTIVES

The objectives of this course is to

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on different types of fittings.*
4. *Provides hands-on training in the trades of House-Wiring*
5. *Overview of metal cutting processes, foundry, Welding and plumbing, is provided through live demonstrations.*
6. *Acquire practical skills by performing the experiments in different shops of workshop.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understand about Fitting and their types.*
4. *Explain the method of preparation of various House-Wiring*
5. *Apply basic techniques in foundry, Welding and plumbing*
6. *Estimate the amount of material required for various models.*

SYLLABUS

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXT BOOKS

1. Felix W, *Basic Workshop Technology: Manufacturing Process*, Independently Published, 2019.
2. Bruce J. Black, *Workshop Processes, Practices and Materials*; Routledge Publishers, 5th edition, 2015.
3. B.S. Raghuwanshi, *A Course in Workshop Technology Vol I. & II*, Dhanpat Rai & Co., 2015 & 2017.

REFERENCES

1. S. K. Hajra Choudhury & Others, *Elements of Workshop Technology, Vol. I*, Media Promoters and Publishers, Mumbai. 14th edition, 2007
2. H. S. Bawa, Workshop Practice, Tata-McGraw Hill, 2004
3. Soni P.M. & Upadhyay P.A., *Wiring Estimating, Costing and Contracting*; Atul Prakashan, 2021-22

R23 **B.Tech-CE**

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(AUTONOMOUS)

I B.Tech – I Sem.

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(23CS0502) COMPUTER PROGRAMMING LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *The course aims to give students hands – on experience and train them on the concepts of the C- programming language.*

COURSE OUTCOMES (COs)

1. *Read, understand, and trace the execution of programs written in C language.*
2. *Select the right control structure for solving the problem.*
3. *Develop C programs which utilize memory efficiently using programming constructs like pointers.*
4. *Develop Debug and Execute programs to demonstrate the applications of arrays in C.*
5. *Develop Debug and Execute programs to demonstrate the applications of functions in C.*
6. *Implement the C programs using File handling Concepts.*

UNIT-I

WEEK 1 -Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

- **i)** Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- **ii)** Exposure to Turbo C, gcc
- **iii)** Writing simple programs using printf(), scanf()

WEEK 2 - Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code. Developing the algorithms/flowcharts for the following sample programs

- **i)** Sum and average of 3 numbers
- **ii)** Conversion of Fahrenheit to Celsius and vice versa
- **iii)** Simple interest calculation

WEEK 3 - Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

- **i)** Finding the square root of a given number
- **ii)** Finding compound interest

iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT-II

WEEK 4 - Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity:

Lab 4: Simple computational problems using the operator' precedence and associativity

i) Evaluate the following expressions. a. A+B*C+(D*E) + F*G b. A/B*C-B+A*D/3 c. A+++B---A d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5 - Objective: Explore the full scope of different variants of "if construct" namely if-else, null else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6 - Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT-III

WEEK 7 - Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8 - Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT-IV

WEEK 9 -Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details along with the total.
v) Write a C program to implement realloc()

WEEK 10 - Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab10: Bitfields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bit fields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT-V

WEEK 11 - Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

- **i)** Write a C function to calculate NCR value.
- **ii)** Write a C function to find the length of a string.
- **iii)** Write a C function to transpose of a matrix.
- **iv)** Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12 - Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

- **i)** Write a recursive function to generate Fibonacci series.
- **ii)** Write a recursive function to find the LCM of two numbers.
- **iii)** Write a recursive function to find the factorial of a number.
- **iv)** Write a C Program to implement Ackermann function using recursion.
- **v)** Write a recursive function to find the sum of series.

WEEK 13 - Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

- **i)** Write a C program to swap two numbers using call by reference.
- **ii)** Demonstrate Dangling pointer problem using a C program.
- **iii)** Write a C program to copy one string into another using pointer.
- **iv)** Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 14 - Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

- **i)** Write a C program to write and read text into a file.
- **ii)** Write a C program to write and read text into a binary file using fread() and fwrite()
- **iii)** Copy the contents of one file to another file.
- **iv)** Write a C program to merge two files into the third file using command-line arguments.
- **v)** Find no. of lines, words and characters in a file

vi) Write a C program to print last n characters of a given file.

TEXT BOOKS

1. Ajay Mittal, *Programming in C: A practical approach*, Pearson.
2. Byron Gottfried, *Schaum' s Outline of Programming with C*, McGraw Hill

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, Prentice Hall of India
2. Forouzan, Gilberg, Prasad, *C Programming, A Problem-Solving Approach*, CENGAGE

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I B.Tech – I Sem.

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(23HS0813) HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to all branches of Engineering)

COURSE OBJECTIVES
The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES (COs)
After the completion of the course, student should be able to

1. Understand the importance of yoga and sports for Physical fitness and sound health
2. Demonstrate an understanding of health-related fitness components.
3. Compare and contrast various activities that help enhance their health.
4. Assess current personal fitness levels.
5. Develop Positive Personality.
6. Apply various activities for holistic development.

UNIT-I
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT-II
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas - Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT-III
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volley ball, Basket ball, Hand ball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
ii) Practicing general and specific warm up, aerobics
iii) Practicing cardio respiratory fitness, tread mill, run test, 9 min walk, skipping and running.

REFERENCES

1. Gordon Edlin, Eric Golanty. *Health and Wellness*, Jones & Bartlett Learning, 14th edn. 2022
2. T.K.V.Desikachar, *The Heart of Yoga: Developing a Personal Practice*
3. ArchieJ. Bahm. *Yoga Sutras of Patanjali*, Jain Publishing Company, 1993
4. Wiseman, John Lofty, *SAS Survival Hand book: The Ultimate Guide to Surviving Anywhere*, William Morrow Paperbacks, Third edition, 2014
5. *The Sports Rules Book / Human Kinetics with Thomas Hanlon.*Human Kinetics, Inc. 3rd edition, 2014

GENERAL GUIDELINES

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor/yoga teacher to mentor the students.

EVALUATION GUIDELINES

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

R23

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I B.Tech – II Sem.

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(23HS0840) ENGINEERING PHYSICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is

To bridge the gap between the Physics in school at 10 +2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc., enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. Analyse the intensity variation of light due to polarization, interference and diffraction
2. Familiarize with the basics of crystals and their structures.
3. Summarize various types of polarization of dielectrics
4. Classify the magnetic materials and understand the concept of Hysteresis curve
5. Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles and understand the behaviour of free electrons in solids.
6. Identify the type of semiconductor using Hall Effect.

UNIT – I Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wave length and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization -Polarization by reflection, refraction and Double refraction - Nicol's Prism - Half wave and Quarter wave plates.

UNIT- II

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC – Miller indices –separation between successive (hkl) planes.

X-ray diffraction: Bragg's law-X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT-III

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - - Types of polarizations –Electronic (Quantitative), Ionic (Quantitative) and

Orientation polarizations (Qualitative) - Lorentz internal field – Clausius - Mossotti equation – complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) – Hysteresis - soft and hard magnetic materials.

UNIT-IV

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations – Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution – Density of states – Fermi energy

UNIT- V

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and its applications

TEXT BOOKS

1. M.N.Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, *A Textbook of Engineering Physics,* S.Chand Publications, 11th edition, 2019.
2. D.K.Bhattacharya and Poonam Tandon, *Engineering Physics*, Oxford Press, 2015.

REFERENCES

1. B.K. PandeyandS. Chaturvedi, *Engineering Physics,* Cengage Learning, 2021
2. Shatendra Sharma, Jyotsna Sharma, *Engineering Physics*, Pearson Education, 2018
3. M.R.Srinivasan, *Engineering Physics,* New Age International Publishers, 2009

WEB RESOURCES

https://www.loc.gov/rr/scitech/selected-internet/physics.html

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B. Tech – II Sem.

L	T	P	C
3	0	0	3

(23HS0831) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS
(Common to all branches of Engineering)

COURSE OBJECTIVES

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to
1. Solve the differential equations related to various engineering fields.
2. Create basic application problems described by second order linear differential equations with constant coefficients.
3. Understand basic properties of standard partial differential equations.
4. Identify solution methods for partial differential equations that model physical processes.
5. Interpret the physical meaning of different operators such as gradient, curl and divergence
6. Estimate the work done against a field, circulation and flux using vector calculus.

UNIT – I

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form - Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT – II

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral with R.H.S term of the types e^{ax} ,sinax, cosax, polynomials in x^n ,e^{ax} V(x), Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion

UNIT – III

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients

UNIT – IV

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

UNIT – V

Vector integration: L Withoutegral – circulation - work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral - Divergence theorem (without proof) and related problems

TEXT BOOKS

1. B. S.Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th edition, 2017
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 10th edition, 2018

REFERENCES

1. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus*, Pearson Publishers, 14th edition, 2018.
2. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett, 2018.
3. Glyn James, *Advanced Modern Engineering Mathematics*, Pearson publishers, 5th edition, 2018.
4. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 5th edition (9th reprint), 2021.
5. B. V. Ramana, *Higher Engineering Mathematics*, McGraw Hill Education, 2017.

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23EE0201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to all branches of Engineering)

COURSE OBJECTIVES

1. *To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field*
2. *This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.*

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to

1. *Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.*
2. *Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations*
3. *Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.*
4. *Demonstrate the characteristics by analyzing the behaviour of electronic devices.*
5. *Develop applications using electronic devices.*
6. *Understand the number systems, codes, Boolean algebra, logic gates, and functioning of logic circuits.*

PART-A: BASIC ELECTRICAL ENGINEERING

UNIT- I

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, wave form, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT- II

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge

UNIT- III

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

TEXT BOOKS

1. D.C.Kulshreshtha, *Basic Electrical Engineering*, Tata McGraw Hill, First edition, 2019
2. P.V.Gupta, M.L.Soni, U.S.Bhatnagar and A.Chakrabarti, *Power System Engineering*, Dhanpat Rai & Co, 2013
3. Rajendra Prasad, *Fundamentals of Electrical Engineering,* PHI publishers, Third edition, 2014

REFERENCES

1. D.P.Kothari and I.J.Nagrath, *Basic Electrical Engineering*, McGraw Hill, Fourth edition, 2019
2. V.K.Mehtha, *Principles of Power Systems*, S.Chand Technical Publishers, 2020
3. T. K. Nagsarkar and M. S. Sukhija, *Basic Electrical Engineering,* Oxford University Press, 2017
4. S. K. Bhatacharya, Person Publications, Basic Electrical and Electronics Engineering, Second edition, 2018

WEB RESOURCES

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART-B: BASIC ELECTRONICS ENGINEERING

UNIT- I

Semi-Conductor Devices: Introduction- Evolution of electronics –Vacuum tubes to nano electronics – Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics - Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier

UNIT-II

Basic Electronic Circuits and Instrumentation: Rectifiers and power supplies: Block diagram description of a DC power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT-III

Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code – Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT,OR,AND,NOR,NAND,XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

TEXT BOOKS

1. R.L.Boylestad & Louis Nashlesky, *Electronic Devices & Circuit Theory*, Pearson Education, 2021.
2. R.P.Jain, *Modern Digital Electronics*, Tata McGraw Hill, 4th edition, 2009

REFERENCES

1. R.S.Sedha, *A Textbook of Electronic Devices and Circuits*, S.Chand & Co, 2010.
2. Santiram Kal, *Basic Electronics - Devices, Circuits and IT Fundamentals*, Prentice Hall, India, 2002.
3. R.T.Paynter, *Introductory Electronic Devices & Circuits – Conventional Flow Version*, Pearson Education, 2009.

R23 **B.Tech-CE**

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B. Tech – II Sem.

L	T	P	C
1	0	4	3

(23ME0302) ENGINEERING GRAPHICS
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is to

1. *Enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing*
2. *Impart knowledge on the projection of points, lines and plane surfaces*
3. *Improve the visualization skills for better understanding of projection of solids*
4. *Develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.*
5. *Make the students understand the viewing perception of a solid object in Isometric and Perspective projections.*

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

1. *Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections*
2. *Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.*
3. *Understand and draw projection of solids in various positions in first quadrant.*
4. *Elucidate the basic principles of sections of solids and true shapes*
5. *Explain principles behind development of surfaces.*
6. *Prepare isometric and perspective sections of simple solids.*

UNIT-I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.

UNIT-II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT-III

Projections of Solids: Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions**:** Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT-IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone

UNIT-V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D & 3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

TEXT BOOKS

1. N. D.Bhatt, *Engineering Drawing,* Charotar Publishing House, 2016.
2. K.L.Narayana and P.Kannaiah, *Engineering Drawing,* Tata McGraw Hill, 2013
3. Dhananjay Jolhe, *Engineering Drawing with an Introduction to Auto CAD,* Tata McGraw Hill, 2017

REFERENCES

1. M.B.Shah and B.C. Rana, *Engineering Drawing,* Pearson Education Inc, 2009

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I B.Tech – II Sem.

L	T	P	C
0	0	2	1

(23CS0503) IT WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables*
2. *To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS*
3. *To teach basic command line interface commands on Linux.*
4. *To teach the usage of Internet for productivity and self-paced life-long learning*
5. *To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, spread sheets and Presentation tools.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Perform Hardware troubleshooting.*
2. *Understand Hardware components and inter dependencies.*
3. *Safeguard computer systems from viruses/worms.*
4. *Document/ Presentation preparation.*
5. *Perform calculations using spread sheets.*
6. *Understand and Analyse the concepts of Prompt Engineering, Language Translation and Creative Writing using AI Tools*

LIST OF EXPERIMENTS

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VM Ware) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1: Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colours, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spread sheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – Chat GPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCES

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dream Tech, 2003.
2. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, WILEY Dream tech, 2013, 3rd edition
3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. Kate J. Chase, *PC Hardware - A Handbook*, PHI (Microsoft)
5. Leslie Lamport, *LaTeX Companion*, PHI/Pearson.
6. David Anfins on and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide*, – CISCO Press, Pearson Education, 3rd edition
7. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide*, CISCO Press, Pearson Education, 3rd edition

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B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23CE0102) ENGINEERING MECHANICS
(Common to Civil & Mechanical Engineering)

COURSE OBJECTIVES

The objectives of this course

1. *To get familiarized with different types of force systems.*
2. *To draw accurate free body diagrams representing forces and moments acting on a body to analyse the equilibrium of system of forces.*
3. *To teach the basic principles of centre of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.*
4. *To apply the Work-Energy method to particle motion.*
5. *To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.*
2. *Analyse different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.*
3. *Calculate the centroid, centre of gravity geometrical laminas & shapes*
4. *Determine the moment of inertial for objects of different geometry*
5. *Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.*
6. *Solve the problems involving the translational and rotational motion of rigid bodies.*

UNIT – I

Introduction to Engineering Mechanics: Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT – II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

UNIT – III

Centroid: Centroid of simple figures (from basic principles)–Centroid of Composite Figures. **Centre of Gravity:** Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT – IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT – V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

TEXT BOOKS

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., *Engineering Mechanics,* McGraw Hill Education, 5th edition, 2017.
2. P.C.Dumir- S.Sengupta and Srinivas V veeravalli, *Engineering Mechanics,* University press, First edition, 2020.
3. S.S Bhavikatti, *A Textbook of Engineering Mechanics,* New age international publications, 4th edition, 2018

REFERENCES

1. Statics and Dynamics, Rogers and M A. Nelson., *Engineering Mechanics*, McGraw Hill Education, First edition, 2017.
2. I.H. Shames., *Engineering Mechanics, Statics and Dynamics*, PHI, 4th edition, 2002
3. J. L. Meriam and L.G. Kraige., *Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics,* John Wiley, 6th edition, 2008.
4. Basudev Battachatia, *Introduction to Statics and Dynamics*, Oxford University Press, Second edition, 2014
5. Hibbeler R.C., *Engineering Mechanics: Statics and Dynamics*, Pearson Education, Inc., New Delhi, 14th Edition, 2022.

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
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I B.Tech – II Sem.

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(23HS0841) ENGINEERING PHYSICS LAB
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objectives of this course is

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall Effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. Operate optical instruments like travelling microscope and spectrometer.
2. Estimate the wave lengths of different colours using diffraction grating.
3. Plot the intensity of the magnetic field of circular coil carrying current with distance.
4. Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
5. Calculate the band gap of a given semiconductor
6. Identify the type of semiconductor using Hall Effect.

LIST OF EXPERIMENTS

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wave length of Laser light using diffraction grating.
7. Estimation of Planck's constant using photo electric effect.
8. Determination of the resistivity of semi conductors by four probe methods.
9. Determination of energy gap of a semi conductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semi conductor using Hall Effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform

bending (or double cantilever) method.

18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCES

1. S. Balasubramanian, M.N. Srinivasan, *A Textbook of Practical Physics,* S.Chand Publishers, 2017.

WEB RESOURCES

- www.vlab.co.in
- https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

R23 **B.Tech-CE**

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

I B.Tech – II Sem.

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(23EE0202) ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
(Common to all branches of Engineering)

COURSE OBJECTIVES
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

COURSE OUTCOMES (COs)
1. *Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.* Usage *of electronic measuring instruments.*
2. *Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.*
3. *Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor*
4. *Demonstrate knowledge of different electronic devices and measuring instruments*
5. *Plot and discuss the characteristics and applications of various electron devices*
6. *Verify the functions of logic gates and flip-flops.*

ACTIVITIES:
1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PARTA: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheatstone bridge
4. Magnetization Characteristics of DC shunt Generator

5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

REFERENCES

1. D.C.Kulshreshtha, *Basic Electrical Engineering,* Tata McGraw Hill, First edition, 2019
2. P.V.Gupta, M.L.Soni, U.S.Bhatnagar and A.Chakrabarti, *Power System Engineering,* Dhanpat Rai & Co, 2013
3. Rajendra Prasad, *Fundamentals of Electrical Engineering*, PHI Publishers, Third edition, 2014

Note: Minimum Six Experiments to be performed.

PARTB: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V–I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K & Dflip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multimeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

REFERENCES

1. R.L.Boylestad & Louis Nashlesky, *Electronic Devices & Circuit Theory*, Pearson Education, 2021.
2. R.P.Jain, *Modern Digital Electronics,* Tata McGraw Hill, 4th edition, 2009
3. R.T.Paynter, *Introductory Electronic Devices & Circuits–Conventional Flow Version,* Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

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I B.Tech – II Sem.

L	T	P	C
0	0	3	1.5

(23CE0103) ENGINEERING MECHANICS & BUILDING PRACTICES LAB

COURSE OBJECTIVES

The objectives of this course is to

1. *Verify the Law of Parallelogram of Forces and Lami's theorem.*
2. *Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.*
3. *Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.*

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. *Understand the purpose of various types of tools used in construction*
2. *Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.*
3. *Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.*
4. *Determine the Centre of gravity different configurations and*
5. *Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.*
6. *Exposure to safety practices in the construction industry.*

LIST OF EXPERIMENTS

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings.

Note: Any ten experiments may be conducted

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I B.Tech – II Sem.

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(23HS0812) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE
(Common to all branches of Engineering)

COURSE OBJECTIVES

The objective of introducing this course is to impart discipline, character, fraternity, team work, social consciousness among the students and engaging them in selfless service.

COURSE OUTCOMES (COs)

After the completion of the course, student should be able to

1. Understand the importance of discipline, character and service motto
2. Solve some societal issues by applying acquired knowledge, facts, and techniques
3. Explore human relationships by analysing social problems
4. Determine to extend their help for the fellow beings and down trodden people.
5. Develop leadership skills and civic responsibilities.
6. Focus on awareness programmes that build community service

UNIT-I Orientation

General Orientation on NSS/NCC/Scouts & Guides/Community Service activities, career guidance

Activities:

i) Conducting – ice breaking sessions – expectations from the course- knowing personal talents and skills
ii) Conducting orientations programs for the students – future plans – activities – releasing road map etc.
iii) Displaying success stories – motivational biopics – award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs – paintings – any other contribution.

UNIT-II Nature & Care

Activities

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organizing Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT-III Community Service Activities

i) Conducting One Day Special Camp in a village contacting village – area leaders – Survey in the village, identification of problems- helping them to solve via media – authorities – experts - etc.

ii) Conducting awareness programs on Health – related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes – Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

REFERENCES

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme Vol. I,* Vidya Kutir Publication, 2021 (ISBN978-81-952368-8-6)
2. *Red Book – National Cadet Corps* – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M.L. and Cornwell D.A., *Introduction to Environmental Engineering*, McGraw Hill, New York, 4th edition, 2008
4. Masters G.M., Joseph K. and Nagendran R., *Introduction to Environmental Engineering and Science*, Pearson Education, New Delhi, 2th edition, 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

GENERAL GUIDELINES

1. Institutes must assign slots in the Time table for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totallingto90marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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II B.Tech – I Sem.

L	T	P	C
3	0	0	3

(23HS0832) NUMERICAL AND STATISTICAL METHODS

COURSE OBJECTIVES

The objectives of this course are

1. *To introduce the tools of differentiation and integration of function of numerical methods that is used in various techniques dealing engineering problems.*
2. *To train students for lifelong learning and successful careers using mathematical concepts of probability, test of hypothesis and test of significance.*

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to

1. *Apply numerical methods to solve algebraic and transcendental equations*
2. *Derive interpolating polynomials using interpolation formulae*
3. *Solve differential and integral equations numerically*
4. *Apply numerical methods to find the solution of algebraic equations using different methods under different condition and numerical solution of system of algebraic equation*
5. *To identify real life problems into Mathematical Models*
6. *To apply the probability theory and testing of hypothesis in the field of civil engineering applications*

UNIT-I

Solution of Algebraic & Transcendental Equations: Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Jacobi 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), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

TEXT BOOKS

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

REFERENCES

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

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

R23

B.Tech-CE

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II B.Tech – I Sem.

L	T	P	C
2	1	0	3

(23HS0841) UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

COURSE OBJECTIVES

The objectives of this course are

1. *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.*
2. *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.*
3. *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 (COs)

On successful completion of this course, the student will be able to

1. *Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)*
2. *Identify one's self and one's surroundings (family, society nature) (L1, L2)*
3. *Apply what they have learnt to their own self in different day-to-day settings in real life (L3)*
4. *Relate human values with human relationship and human society. (L4)*
5. *Justify the need for universal human values and harmonious existence (L5)*
6. *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)

Lecture1: 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 Fulfil the Basic Human Aspirations
Tutorial 3: 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.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT – III
Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)
Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14:'Trust'–the Foundational Value in Relationship
Tutorial 7: 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
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT – IV
Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)
Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11Exploring 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
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: 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 UNIT V – 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:

Text book and Teachers Manual

a. The Text book

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

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, *Teacher's Manual for A Foundation Course in Human Values and Professional Ethics*, Excel Books, 2nd Revised Edition, New Delhi, 2019. ISBN978-93-87034-53-2

REFERENCES

1. *Jeevan Vidya*: EkParichaya, ANagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. *Human Values*, A.N.Tripathi, New Age Intl. Publishers, New Delhi, 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. *Rediscovering India* – by Dharampal
10. *Hind Swarajor Indian Home Rule* – by Mohandas K.Gandhi
11. *India Wins Freedom* – Maulana Abdul Kalam Azad
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 analysing 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%2023.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
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

II B.Tech – I Sem.

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3	0	0	3

(23CE0105) SURVEYING

COURSE OBJECTIVES

The objectives of this course is to

1. *Know the principle and methods of surveying and measuring of horizontal and vertical distances and angles*
2. *Identification of source of errors and rectification methods*
3. *Know surveying principles to determine areas and volumes*
4. *Setting out curves and use modern surveying equipments for accurate results*
5. *Know the basics of Photogrammetry Surveying*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. Carryout basic surveying using Chain and Compass and prepare the relevant maps
2. Perform various levelling operations and prepare contour maps for area and volume calculation
3. Measure distances and angles using vernier transit theodolite for traverse surveying
4. Conduct the traverse by various methods and calculate the missing parameters by omitted measurement
5. Set the various types of curves on the field and apply the principals of Tacheometric surveying using modern surveying methods
6. Conduct basic surveying operations using Photogrammetry surveying

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 leveling, 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 earth work 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. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Surveying (Vol–1, 2 & 3),* Laxmi Publications (P) Ltd., New Delhi, 16th edition 2022.
2. Arora K R, *Surveying (Vol 1, 2 & 3),* Standard Book House, Delhi, 12th edition, 2015.

REFERENCES

1. C. Venkatramaiah, *A Text book of Surveying,* Universities Press, 1st edition, 2011.
2. Chandra A.M, *Plane Surveying and Higher Surveying,* New Age International Pvt. Ltd., Publishers, New Delhi, 3rd edition, 2015.
3. N.Basak, *Surveying and Levelling,* Tata McGraw Hill Publishing Co. Ltd., New Delhi, 4th edition, 2014.
4. Duggal S.K., *Surveying (Vol – 1 & 2),* Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.

WEB RESOURCES

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

R23 **B.Tech-CE**

SIDDHARTH INSTITUTE OF ENGINEERING &TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

II B.Tech – I Sem.

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3	0	0	3

(23CE0106) STRENGTH OF MATERIALS

COURSE OBJECTIVES

The objectives of this course are

1. *To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress*
2. *To impart concepts of shear force and bending moment on various types of beams and loading conditions*
3. *To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.*
4. *The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.*
5. *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 (COs)

On successful completion of this course, the student will be able to

1. *Apply the elastic principles for simple prismatic members to determine various stresses and strains and to develop relationships between various elastic constants.*
2. *Calculate the magnitudes of shear force and bending moments and to develop shear force and bending moment diagrams for statically determinate beams.*
3. *Derive the expressions for flexural and shear stresses that the beams are subjected and apply them to evaluate their magnitude along the cross section.*
4. *Derive the application of torsional stresses on circular shaft subjected to torsion and apply the equation for problems subjected to torsion.*
5. *Calculate the slope and deflections of statically determinate beams subjected to transverse loading using various methods.*
6. *Find the crippling load for long columns and to find stresses generated in the pressure vessels subjected to internal pressure.*

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 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

UNIT-V

Columns: 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's Gordon formula – Eccentric loading and Secant formula – Prof. 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

TEXT BOOKS

1. R.K.Bansal, *A Text Book of Strength of Materials*, Laxmi Publications (P) Ltd., New Delhi, 6th edition.
2. R.K.Rajput, *Strength of Materials*, S.Chand & Co Ltd, New Delhi, 6th edition.

REFERENCES

1. S. Ramamrutham, R. Narayanan, *Strength of Materials*, Dhanpat Rai Publishing Company, 2020.
2. Beer and Johnston, *Mechanics of Materials*, McGraw Hill India Pvt. Ltd., 8th edition (SI Units), 2020.
3. S.S. Bhavikatti, *Strength of Materials*, Vikas Publishing House Pvt Ltd, 4th edition.
4. R.S Khurmi, *Strength of Materials*, S.Chand & Company Ltd. 23rd edition.
5. S.S.Ratan Tata, *Strength of Materials*, McGraw Hill Publications, 3rd edition, 2016.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

II B.Tech – I Sem.

L	T	P	C
3	0	0	3

(23CE0107) FLUID MECHANICS

COURSE OBJECTIVES

The objectives of this course are

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

COURSE OUTCOMES (COs)

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

1. *Evaluate the fundamental properties of fluids.*
2. *Apply the laws of fluid statics for measuring fluid pressure and stability of floating bodies.*
3. *Classify various flows and estimate the velocity and direction of flow*
4. *Apply continuity equation for flow problems*
5. *Apply the Bernoulli's equation for various flow problems*
6. *Analyze pipe flow problems using Darcy – Weisbach equation.*

UNIT-I

Basic Concepts and Definitions: Differentiate solid and fluid; Density, Specific weight, Specific volume, Specific gravity, Viscosity; Capillarity, Surface tension, Compressibility and Vapour pressure.

UNIT-II

Fluid Statics: Fluid Pressure: Pressure at a point, Pascal's law, Pressure variation with temperature, density and altitude; Measurement of Pressure - Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force for 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; 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 equation in Cartesian form

UNIT-IV

Fluid Dynamics: Surface and body forces; Equations of motion - Euler‘s equation; Bernoulli‘s equation – Derivation; Practical applications of Bernoulli‘s equation: Venturimeter, Orificemeter 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 Gradient Line and Total Energy Line; Equivalent pipe – Pipes in series and parallel.

TEXT BOOKS

1. P. M. Modi and S. M. Seth, *Hydraulics and Fluid Mechanics*, Standard Book House, 22nd edition, 2019.
2. R. K. Bansal, *A Text of Fluid Mechanics and Hydraulic Machines*, Laxmi Publications (P) Ltd., New Delhi, 11th edition, 2024.

REFERENCES

1. K. Subrahmanya, *Theory and Applications of Fluid Mechanics*, Tata McGraw Hill, 2nd edition, 2018.
2. N. Narayana Pillai, *Principles of Fluid Mechanics and Fluid Machines*, Universities Press Pvt Ltd, Hyderabad. 3rd edition, 2009
3. Frank M. White, Henry Xue, *A Text book of Fluid Mechanics*, 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. S K Som, Gautam Biswas and S Chakraborty, *Introduction to Fluid Mechanics and Fluid Machines*, 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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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II B.Tech – I Sem.

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(23CE0108) SURVEYING LAB

COURSE OBJECTIVES

The objectives of this course are to

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Conduct the chain survey and point out offset distances of various features alongside a road*
2. *Measure the distance between two inaccessible points by using compass, theodolite and total station*
3. *Conduct fly levelling using height of instrument and rise & fall methods*
4. *Measure the horizontal, vertical angles and height of object by using theodolite*
5. *To determine the area and subsequently, the perimeter using plane table and total station*
6. *Set out simple curve by using theodolite and determine the levels of contours*

LIST OF EXPERIMENTS

1. Chain survey of road profile with offsets in case 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)
5. Fly levelling: Rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible points by using total station.
11. Setting out a curve
12. Determining the levels of contours

Any Eight experiments can be conducted

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B.Tech-CE

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(23CE0109) STRENGTH OF MATERIALS LAB

COURSE OBJECTIVES

The objectives of this course are

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Determine modulus of elasticity for mild steel from stress curve and stiffness for closely coiled helical spring from load-deflection curve by conducting tension test*
2. *Determine the Young's modulus for a given material of simply supported and cantilever beam, also verify the Maxwell's Reciprocal theorem by measuring the Deflection under different loads.*
3. *Determine the modulus of rigidity for mild steel by conducting torsion test*
4. *Determine the hardness number of different materials by conducting the Rockwell hardness test.*
5. *Conduct Compression tests on Concrete, Wood and shear test on Wood to calculate their Compressive and Shear strengths.*
6. *Assess the Toughness of material by conducting the Impact test on specimen*

LIST OF EXPERIMENTS

1. Tension test on mild steel bar
2. Bending test on (steel/wood) cantilever beam
3. Bending test on simply supported beam
4. Torsion test on mild steel bar
5. Hardness test on metals
6. Compression test on open coiled spring
7. Tension test on closely coiled spring
8. Compression test on wood/concrete
9. Izod/Charpy impact test on metals
10. Shear test on materials
11. Use of electrical resistance strain gauges
12. Continuous beam – Deflection test

Any Eight experiments can be conducted

WEB REFERENCES

https://sm-nitk.vlabs.ac.in

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II B.Tech – I Sem.

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(23CE0110) BUILDING PLANNING AND DRAWING

COURSE OBJECTIVES

The objectives of this course are

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Familiarized about the practices of building drawing including its sign conventions*
2. *Draw various types of brick masonry units such as English and Flemish bond.*
3. *Draw different types and views of doors, windows and ventilators*
4. *Draw various types of pitched roofs & drawing and detailing of RCC roofs*
5. *Drawing line diagram of building in accordance with Bye-Laws and developing plan, elevation and sectional views of single storey building from the line diagram.*
6. *Functional designing and drawing of Hospital and Industrial Building.*

COURSE CONTENT

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& Ventilators.
6. Detailing & Drawing of 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. Gurcharan Singh and Jagdish Singh, *Planning, Designing and Scheduling*, Standard Publishing, 4th edition, 2020
2. M. Chakraborti, *Building Planning and Drawing*, Khanna Publishers, 13th edition, 2023
3. M G Shah, C M Kale and S Y Patki, *Building Drawing*, Tata McGraw Hill (P), New Delhi, 2nd edition, 1985.

REFERENCES

1. National Building Code (Volume- I & II), 2016

2. M G Shah and C M Kale, *Principles of Building Drawing,* Trinity Publications, New Delhi, 2017.
3. B. P. Verma, *Civil Engineering Drawing and House Planning*, Khanna Publishers, New Delhi, 13th edition, 2006
4. Suraj Singh, *Civil Engineering Building Practice,* CBS Publications, New Delhi, and Chennai,1st edition, 2014
5. G. C Saha and Joy Gopal Jana, *Building Materials and Construction*, McGraw Hill Education (P) India Ltd. New Delhi, 1st edition

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B.Tech-CE

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II B.Tech – I Sem.

L	T	P	C
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(23HS0805) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

The objectives of this course

1. *To make the students to get awareness about the environment.*
2. *To understand the importance of protecting natural ecosystems for future.*
3. *To save earth from the inventions by Engineers*.

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *To make the students to get awareness about the environment and its components.*
2. *To understand the importance of protecting natural ecosystems.*
3. *To understand various types of pollutions and their effects.*
4. *To understand the various engineering techniques to protect the environment.*
5. *To make awareness about the social issues and laws of environmental protection.*
6. *To understand the concept of sustainable development and role of Engineering and Technology in environment and human health.*

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:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction, 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-sports 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:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. 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..

TEXT BOOKS

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

REFERENCES

1. Deeksha Dave and E.Sai Baba Reddy, *Textbook of Environmental Science*, Cengage Publications.
2. M.Anji Reddy, *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*, Prentice hall 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

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II B.Tech – II Sem.

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2	0	0	2

(23HS0848) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Humanities Elective-I)

COURSE OBJECTIVES

The objectives of this course are

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Define the concepts related to Managerial Economics, financial accounting and management*
2. *Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.*
3. *Apply the Concept of Production cost and revenues for effective Business decision*
4. *Analyze how to invest their capital and maximize returns.*
5. *Evaluate the capital budgeting techniques.*
6. *Develop the accounting statements and evaluate the financial performance of business entity*

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, Methods and Evaluation - Projects – Pay Back 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 Bookkeeping, 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

TEXT BOOKS

1. Varshney & Maheswari, *Managerial Economics*, Sultan Chand.
2. Aryasri, *Business Economics and Financial Analysis*, 4th edition, MGH.

REFERENCES

1. Ahuja Hl, *Managerial Economics,* S Chand.
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, 2th edition, New Delhi.
4. Domnick Salvatore, *Managerial Economics in a Global Economy*, Cengage.

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(23HS0850) ORGANIZATIONAL BEHAVIOUR
(Humanities Elective-I)

COURSE OBJECTIVES
The objectives of this course are
1. *To enable student's comprehension of organizational behaviour.*
2. *To offer knowledge to students on self-motivation, leadership and management.*
3. *To facilitate them to become powerful leaders.*
4. *To impart knowledge about group dynamics.*
5. *To make them understand the importance of change and development.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. *Define the Organizational Behaviour, its nature and scope.*
2. *Understand the nature and concept of Organizational behaviour.*
3. *Apply theories of motivation to analyse the performance problems.*
4. *Analyse the different theories of leadership.*
5. *Evaluate group dynamics.*
6. *Develop as powerful leader.*

UNIT – I
Introduction to Organizational Behaviour: 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 - Hertzberg's Two Factor Theory -Vroom's theory of expectancy –Mc Cleland's theory of needs – McGregor's theory X and theory Y–Adam's equity theory – Locke's goal setting theory– Alderfer's ERG 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-Women and Corporate leadership.

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

TEXT BOOKS

1. Luthans, Fred, *Organizational Behaviour*, McGraw-Hill, 12th edition, 2011
2. P Subba Ran, *Organizational Behaviour*, Himalya Publishing House, 2017

REFERENCES

1. Mc Shane, *Organizational Behaviour*, TMH, 2009
2. Nelson, *Organizational Behaviour*, Thomson, 2009.
3. Robbins, P.Stephen, Timothy A. Judge, *Organizational Behaviour*, Pearson, 2009.
4. Aswathappa, *Organizational Behaviour*, Himalaya, 2009

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(23HS0851) BUSINESS ENVIRONMENT
(Humanities Elective-I)

COURSE OBJECTIVES

The objectives of this course are

1. *To make the student to understand about the business environment.*
2. *To enable them in knowing the importance of fiscal and monitory policy.*
3. *To facilitate them in understanding the export policy of the country.*
4. *To impart knowledge about the functioning and role of WTO.*
5. *To encourage the student in knowing the structure of stock markets.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Define Business Environment and its Importance.*
2. *Understand various types of business environment.*
3. *Apply the knowledge of Money markets in future investment.*
4. *Analyse India's Trade Policy.*
5. *Evaluate fiscal and monitory policy.*
6. *Develop a personal synthesis and approach for identifying business opportunities.*

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 & Characteristics of business

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.

TEXT BOOKS

1. Francis Cherunilam, *International Business: Text and Cases*, Prentice Hall of India, 2009.
2. K. Aswathappa, *Essentials of Business Environment: Texts and Cases & Exercises*, 13th revised edition, HPH, 2016.

REFERENCES

1. K. V. Sivayya, V. B. M Das, *Indian Industrial Economy*, Sultan Chand Publishers, New Delhi, India, 2009.
2. Sundaram, Black, *International Business Environment Text and Cases*, Prentice Hall of India, New Delhi, India, 2009.
3. Chari.S. N, *International Business*, Wiley India, 2009.
4. E.Bhattacharya, *International Business*, Excel Publications, New Delhi, 2009.

R23 **B.Tech-CE**

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(23CE0111) ENGINEERING GEOLOGY

COURSE OBJECTIVES

The objectives of this course are

1. *To know the importance of Engineering Geology to the Civil Engineering.*
2. *To enable the students understand what minerals and rocks are and their formation and identification.*
3. *To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.*
4. *To enable the student realize its importance and applications of Engineering Geology in Civil Engineering constructions.*
5. *Concepts of Groundwater and its geophysical methods.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Realize the significance of geology in civil engineering.*
2. *Identify and understand the properties of Minerals and Rocks.*
3. *Study the structural geological aspects of geological formation.*
4. *Explore Engineering consideration of faults, fold, joints and unconformities, dip and strike.*
5. *Recognize the importance of groundwater, earth quakes, landslides, and geophysical methods in geological investigations for accessing the suitability of civil engineering.*
6. *Ascertain geological considerations of dams, reservoirs, and tunnels*

UNIT-I

Introduction: Branches of Geology—Importance of Geology in Civil Engineering with case studies—weathering of rocks—Geological agent—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 bells—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.

TEXT BOOKS

1. N.Chenna Kesavulu, *Engineering Geology,* Mc-Millan India Ltd, Second edition, 2014
2. Parbin Singh, *Engineering and General Geology,* Kataria, S.K. & Sons

REFERENCES

1. Subinoy Gangopadhyay, *Engineering Geology*, Oxford University Press
2. J.C.Harvey, *Geology for Geotechnical Engineers*, Cambridge University Press,1982
3. K.V.G.K.Gokhale, *Principals of Engineering Geology*, B.S Publications

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B.Tech-CE

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II B.Tech – II Sem.

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(23CE0112) CONCRETE TECHNOLOGY

COURSE OBJECTIVES

The objectives of this course are to

1. Learn materials and their properties used in the production of concrete
2. Learn the behaviour of concrete at fresh stage
3. Learn the behaviour of concrete at hardened stage
4. Learn the influence of elasticity, creep and shrinkage on concrete
5. Learn the mix design methodology and special concretes

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Determine the properties of constituents of concrete*
2. *Execute the construction of works related to concrete*
3. *Determine the engineering properties of hardened concrete*
4. *Evaluate the strength and quality of concrete using non-destructive testing*
5. *Determine the elastic properties of concrete and study the effect of creep & shrinkage on quality of concrete*
6. *Proportionate the various grades of concrete mixes using IS & ACI methods*

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, Shot Crete.

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 and Special Concretes: Ready mixed concrete, Fiber reinforced concrete – Different types of fibers – 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.

TEXT BOOKS

1. A.M. Neville, *Properties of Concrete*, Pearson Publications, 4th edition,1995
2. M.L.Gambhir, *Concrete Technology*, Tata McGraw Hill Publishers, New Delhi, 5th edition, 2013.
3. Job Thomas, *Concrete Technology*, Cengage Publications, 1st edition, 2015

REFERENCES

1. P.K.Mehta and Moterio, *Concrete Microstructure, Properties of Materials,* McGraw Hill, 4th edition, 2014
2. J.J. Brooks and A.M. Neville, *Concrete Technology,* Pearson, 2nd edition, 2019
3. M.S.Shetty, *Concrete Technology*, S.Chand & Co., 2004
4. A.R.Santha Kumar, *Concrete Technology,* Oxford University Press, New Delhi, 2nd edition, 2018

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

II B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23CE0113) STRUCTURAL ANALYSIS

COURSE OBJECTIVES

The objectives of this course are

1. *To learn about energy theorems and indeterminate structural analysis*
2. *To analyse fixed and continuous beams*
3. *To learn slope-deflection and Moment distribution method of structural analysis*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Apply energy theorems and Castigliano's I-theorem to analyze beams & trusses.*
2. *Analyse indeterminate structures using Castigliano's II-theorem.*
3. *Draw Shear force & bending moment diagrams for fixed& continuous beams.*
4. *Determine the deflections in fixed beams.*
5. *Analyse continuous beams and portal frames using slope-deflection method.*
6. *Analyse continuous beams and portal frames 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 upto 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.

TEXT BOOKS

1. Dr.R.Vaidyanathan and Dr.P.Perumal, *Structural Analysis Vol. I & II*, Laxmi Publications (p) Ltd., 3rd edition, 2016.
2. C.S.Reddy, *Basic Structural Analysis*, Tata McGraw Hill Publishers, 3rd edition, 2017.

REFERENCES

1. Bhavikatti, S.S, *Structural Analysis – Vol. I & Vol. II*, Vikas Publishing Pvt Ltd., New Delhi, 2013.
2. R.C Hibbeler, *Structural Analysis*, Pearson Education, Ninth edition, 2017.
3. Devdas Menon, *Structural Analysis*, Alpha Science International, Limited, 2010.
4. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, *Theory of Structures*, Laxmi Publications Pvt. Ltd., New Delhi, 2017.

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B.Tech-CE

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II B.Tech – II Sem.

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(23CE0114) HYDRAULICS & HYDRAULIC MACHINERY

COURSE OBJECTIVES

The objectives of this course are

1. Introduce concepts of laminar and turbulent flows
2. Teach principles of uniform flows through open channel.
3. Teach principles of non-uniform flows through open channel.
4. Impart knowledge on design of turbines.
5. Impart knowledge on design of pumps.

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. Distinguish between laminar and turbulent flow and apply boundary layer theory
2. Design hydraulically efficient channel section for open channel flow
3. Measure discharge and velocity in gradually varied flow
4. Calculate depth of hydraulic jump
5. Calculate hydrodynamic force of jets on stationary, moving flat, inclined and curved vanes and efficiency of turbines.
6. Determine work done and efficiency of centrifugal pump.

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

TEXT BOOKS

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

REFERENCES

1. R.K.Bansal, *A Textbook of Fluid Mechanics and Hydraulic Machines,* Laxmi Publications (P) Ltd., New Delhi, 11th edition, 2024.
2. Frank M.White, Henry Xue, *Fluid Mechanics,* Tata McGraw Hill, 9th edition, 2022
3. C.S.P.Ojha, R.Berndtsson and P.N.Chadramouli, *Fluid Mechanics and Machinery,* Oxford University Press, 2010.
4. S K Som, Gautam Biswas and S Chakraborty, *Introduction to Fluid Mechanics and Fluid Machines,* Tata McGraw Hill, 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/SA

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II B.Tech – II Sem.

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(23CE0115) CONCRETE TECHNOLOGY LAB

COURSE OBJECTIVES

The objectives of this course is

1. *To test basic properties of ingredients of concrete fresh and hardened concrete properties*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. Conduct tests on cement to assess the suitability for construction
2. Perform tests on fine aggregates to determine the various properties for suitability in construction
3. Perform test on course aggregates to suggest the quality in preparation of concrete
4. Conduct both laboratory and field tests on fresh concrete for determine workability
5. Conduct tests on hardened concrete for determine elastic properties of concrete
6. Assess the strength and quality of concrete by Non-Destructive Testing on concrete

DETAILED SYLLABUS

1. Tests on Cement
- 1.1 Normal Consistency and Fineness of cement.
- 1.2 Initial setting time and Final setting time of cement.
- 1.3 Specific gravity and soundness of cement.
- 1.4 Compressive strength of cement

2. Tests on Fine Aggregates
- 2.1 Grading and fineness modulus of Fine aggregate by sieve analysis.
- 2.2 Specific gravity of fine aggregate
- 2.3 Water absorption and Bulking of sand.

3. Tests on Coarse Aggregates
- 3.1 Grading of Coarse aggregate by sieve analysis.
- 3.2 Specific gravity of coarse aggregate
- 3.3 Water absorption of Coarse aggregates

4. Tests on fresh Concrete
- 4.1 Workability of concrete by compaction factor method
- 4.2 Workability of concrete by slump test
- 4.3 Workability of concrete by Vee-bee test.

5. Tests on Hardened Concrete
- 5.1 Compressive strength of cement concrete and Modulus of rupture
- 5.2 Young’s Modulus and Poisson’s Ratio
- 5.3 Split tensile strength of concrete.
- 5.4 Non-Destructive testing on concrete (for demonstration)

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(23CE0116) ENGINEERING GEOLOGY LAB

COURSE OBJECTIVES

The objectives of this course are

1. To identify the megascopic types of Ore minerals & Rock forming minerals.
2. To identify the megascopic types of Igneous, Sedimentary, Metamorphic rocks
3. To identify the topography of the site & material selection

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. Identify megascopic minerals & their properties.
2. Identify megascopic rocks & their properties.
3. Ability to prepare the geological maps and interpret the site conditions.
4. Solve various Geological Problems.
5. Ability to interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using various tests.
6. Identify the different structures in the field.

LIST OF EXPERIMENTS

1. Physical properties of minerals: Megascopic identification of
   a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
   c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.

4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology

REFERENCES

1. M T Mauthesha Reddy *Applied Engineering Geology Practicals*, New Age International Publishers, 2nd edition.
2. Tony Waltham, *Foundations of Engineering Geology,* Spon Press, 3rd edition, 2009

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II B.Tech – II Sem.

L	T	P	C
0	1	2	2

(23HS0818) SOFT SKILLS

COURSE OBJECTIVES

The objectives of this course are

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

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *List out various elements of soft skills*
2. *Describe methods for building professional image*
3. *Apply critical thinking skills in problem solving*
4. *Analyse the needs of an individual and team for well-being*
5. *Assess the situation and take necessary decisions*
6. *Create a productive workplace atmosphere using social and work life skills ensuring personal and emotional well-being*

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 & features of Problem Solving – Managing Conflict – Conflict resolution – 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 participants 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.

TEXT BOOKS

1. Mitra Barun K, *Personality Development and Soft Skills*, Oxford University Press, Pap/Cdr edition, 2012

2. Dr Shikha Kapoor, *Personality Development and Soft Skills: Preparing for Tomorrow*, IK International Publishing House, 2018

REFERENCES

1. Sharma, Prashant, *Soft Skills: Personality Development for Life Success*, BPB Publications 2018.
2. Alex K, *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 (Paperback 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-R9hDl7lU
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

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(23HS0815) DESIGN THINKING & INNOVATION

COURSE OBJECTIVES

The objective of this course is to familiarize students with design thinking process as a tool for break through 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 (COs)

1. Define the concepts related to design thinking. (L1,L2)
2. Explain the fundamentals of Design Thinking and innovation (L1,L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment (L4)
5. Evaluate the value of creativity (L5)
6. 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, analyse, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, 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 start-up

TEXT BOOKS

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

REFERENCES

1. David Lee, *Design Thinking in the Classroom*, Ulysses press
2. Shrutin N Shetty, *Design the Future*, Norton Press
3. William Lidwell, *Universal Principles of Design- Kritinaholden*, Jill Butter.
4. Chesbrough.H, *The Era of Open Innovation*, 2013

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 asocially 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 gradecould 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 OUTCOMES

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 stereotypes 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 orinstitutions
- 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. Aqua culture
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 lvel- 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. AIDS awareness 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 allottedhabitation 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 logbook need to be maintained bythe students batch, which should be countersigned by the governmental agencyrepresentative and the teacher-mentor, who is required to periodically visit thestudents and guide them.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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III B.Tech – I Sem.

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(23CE0117) WATER RESOURCES ENGINEERING

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamental concepts of hydrology, including precipitation, evaporation, Infiltration, 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)

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

1. *Analyze knowledge of the hydrologic cycle, precipitation measurement, evaporation and infiltration processes, runoff computation, and design flood estimation.*
2. *Evaluate, hydrographs, unit hydrograph and S curve hydrograph for flood prediction and analyze groundwater flow parameters.*
3. *Assess the need for irrigation, duty, delta, and the relationship between soil, water, and plants.*
4. *Assess irrigation effectiveness to ensure long-term agricultural output.*
5. *Design canal using Kennedy's and Lacey's theory for efficient water transportation and avoid water logging.*
6. *Evaluate the stability of diversion head works, such as weirs and barrages using Bligh and Khosla theories.*

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 Runoff, Computation of Runoff; Design Flood; Estimation of Maximum Rate of Runoff; 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; Quality for Irrigation Water. Duty and Delta; Duty at Various Places; Relation between Duty and Delta; Factors affecting Duty; 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; Kor Depth and Kor Period; 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 in Canal; Lining of Irrigation Channels – Necessity, Advantages and Disadvantages; Types of Lining; Design of Lined Canal.

UNIT – V

Diversion Head Works: Types of 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. Punmia & Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd, 17th edition, 2021
2. K. Subramanya, *Engineering Hydrology*, The Tata McGraw Hill Company, Delhi, 5th edition, 2020

REFERENCES

1. S. K. Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, Delhi, 4th edition, 2017
2. Jayarami Reddy, *Engineering Hydrology*, Laxmi Publications Pvt. Ltd., New Delhi, 3rd edition, 2016
3. P.N.Modi, *Irrigation and Water Resources & Water Power*, Standard Book House, 6th edition, 2020

ONLINE LEARNING RESOURCES

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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III B.Tech – I Sem.

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(23CE0118) DESIGN OF REINFORCED CONCRETE STRUCTURES

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamental methods of concrete structure design, including elastic, ultimate load, and limit state methods.*
2. *Analyze and design reinforced concrete beams, slabs, staircases, columns, and footings using the Limit State Method as per IS codes.*
3. *Evaluate the behaviour of reinforced concrete members in terms of flexure, shear, torsion, bond, and anchorage.*
4. *Apply design principles to ensure serviceability and safety of concrete structures under various loading conditions.*
5. *Develop skills to use design aids and professional software for the analysis and design of RC structures.*

COURSE OUTCOMES (COs)

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

1. *Design singly and doubly reinforced beams by Limit State Method.*
2. *Design for flanged beams and RC members for shear, torsion and bond.*
3. *Analyze and design cantilever and one-way slabs.*
4. *Analyze and design two-way and continuous slabs.*
5. *Design short columns and footings considering axial and eccentric loading conditions.*
6. *Design for limit state of serviceability in aspect of deflection & cracking and design of staircase.*

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

REFERENCES

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, 2013
3. N.Subramanian, *Design of Reinforced Concrete Structures*, Oxford University Press, 2013
4. IS 456:2000 – "Plain and Reinforced Concrete – Code of Practice".

ONLINE LEARNING RESOURCES

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

NOTE: Assignment on preparation of drawing sheets detailing various RC Elements

All the designs to be taught in Limit State Method 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. Weightage for Part -A is 40% and Part-B is 60%.

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(23CE0119) GEOTECHNICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course is 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 behaviour.*
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 (COs)

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

1. *Classify the soils based on physical and index properties and to find the consistency limit of soils*
2. *Determine the permeability and hydraulic conductivity by using Darcy's Law and apply Laplace equation for seepage analysis*
3. *Apply Bossinesq's, Westergaard, and Newmarks theory to determine vertical stress due to different types of loadings*
4. *Determine the OMC and MDD of soil by compaction*
5. *Determine the pre-consolidation pressure and estimate primary consolidation settlements*
6. *Determine shear strength of soils using experimental methods and interpret test results.*

UNIT – I

Introduction: Soil Formation - Soil Structure - Adsorbed water – Mass - Volume relationship - Relative density. Index Properties of Soils: Moisture Content, Specific Gravity, in-situ density, Grain size analysis - Sieve and Hydrometer methods - Consistency limits and indices - I.S. Classification of soils.

UNIT-II

Permeability: Soil Water - Capillary Rise - Flow of Water through Soils - Darcy's Law- Permeability - Factors affecting - Laboratory - Determination of Coefficient of Permeability- Permeability of Layered Systems.

Seepage through Soils: Total, Neutral and Effective Stresses - Quick Sand Condition - Seepage through Soils - Flow Nets, Characteristics and Uses.

UNIT-III

Stress Distribution in Soils: Bossinesq's and Wester Guard's Theories for Point Loads and Areas of Different Shapes - Newmark's Influence Chart

Compaction: Mechanism of Compaction - Factors Affecting - Effects of Compaction on Soil Properties - Field Compaction Equipment - Compaction Control.

UNIT-IV

Consolidation: Types of Compressibility -Primary Consolidation and Secondary Consolidation - Stress History of Clay; E-P And E-Log P Curves - Normally Consolidated Soil, Over Consolidated Soil and Under Consolidated Soil - Pre-Consolidation Pressure and Its Determination - Terzaghi's I-D Consolidation Theory - Coefficient of Consolidation: Square Root Time and Logarithm of Time Fitting Methods.

UNIT-V

Shear Strength of Soils: Importance of Shear Strength- Mohr's- Coulomb Failure Theories - Types of Laboratory Tests for Strength Parameters Strength Tests Based on Drainage Conditions - Critical Void Ratio - Liquefaction

TEXT BOOKS

1. K.R.Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, Delhi, 7th edition, 2022
2. C.Venkataramiah, *Geotechnical Engineering*, New Age International Pvt. Ltd, 6th edition, 2018

REFERENCES

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation* Laxmi Publications Pvt. Ltd, New Delhi, 18th edition, 2023
2. Iqbal H.Khan, *Geotechnical Engineering,* PHI Publishers, 4th edition, 2021
3. Gopal Ranjan & ASR Rao, *Basic and Applied Soil Mechanics*, New Age International Pvt. Ltd, New Delhi, 5th edition, 2023

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/105101201
https://nptel.ac.in/courses/105105185

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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III B.Tech – I Sem.

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(23CS0519) INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS

COURSE OBJECTIVES

The objectives of this course is to

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

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to

1. *Explain core quantum principles in a non-mathematical manner.*
2. *Compare classical and quantum information systems.*
3. *Identify theoretical issues in building quantum computers.*
4. *Discuss quantum communication and computing concepts.*
5. *Recognize applications, industry trends, and career paths in quantum technology.*
6. *Societal & ethical implications of quantum technologies*

UNIT-I

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-II

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-III

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-IV

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-V

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, Psi Quantum, 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.

TEXT BOOKS

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.

REFERENCES

1. David McMahon, *Quantum Computing Explained*, Wiley, 2008.

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
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III B.Tech – I Sem.

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(23CE0120) PRE-STRESSED CONCRETE
(Professional Elective-I)

COURSE OBJECTIVES

The objectives of this course is to

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 behaviour of composite beams under different loading conditions.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Apply the principles and methods of prestressing by understanding the need for high-strength materials.*
2. *Evaluate various losses of prestress in pre-tensioned and post-tensioned members.*
3. *Analyze prestressed beams for flexure and shear with various cable profile.*
4. *Design prestressed concrete beams considering flexural and shear stresses.*
5. *Determine the short-term & long-term deflections in prestressed concrete beams.*
6. *Analyze the stress distribution and differential shrinkage in composite beams.*

UNIT - I

Introduction: Principles of Pre-Stressing - Prestressing Systems - Pre-Tensioning and Post Tensioning - Advantages and Limitations of Prestressed Concrete - Need for High Strength Materials.

Methods of Prestressing: 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 Prestressed 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. N. Krishna Raju, *Prestressed Concrete*, Tata McGraw Hill Publications, 6th edition 2018
2. N.Rajagopalan, *Prestressed Concrete*, Narosa Publishing House, 2nd edition, 2017.

REFERENCES

1. T.Y. Lin & Ned H. Burns, *Design of Prestressed Concrete Structures*, John Wiley & Sons, 3rd edition, 2010.
2. Praveen Nagrajan, *Prestressed Concrete Design*, Pearson Publications, 2013.
3. Ramamrutam, *Prestressed Concrete*, Dhanpat Rai Publications, 2020.
4. IS 1343:2012, Codebook on “Prestressed Concrete – Code of Practice”.

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B.Tech-CE

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III B.Tech – I Sem.

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(23CE0121) AIR POLLUTION AND CONTROL
(Professional Elective – I)

COURSE OBJECTIVES

The objectives of this course is to

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. *Evaluate appropriate sampling techniques to identify air pollutants in ambient air and stack emissions*
2. *Predict air quality by analysing meteorological factors and applying dispersion models such as Box and Gaussian models.*
3. *Evaluate suitable dust removal equipment based on particle size distribution and control mechanisms for particulate pollution*
4. *Design suitable control systems for particulate pollutants using appropriate removal equipment*
5. *Design adsorption and absorption equipment for the removal of gaseous pollutants*
6. *Assess the sources of vehicular and indoor air pollution and propose appropriate mitigation strategies.*

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, 1st edition, 2007
2. Khare M, Sharma P, Kota, S.H, Sumanth C, *Air Pollution Science Engineering and Management Fundamentals*, CRC Press, 1st edition, 2024.

REFERENCES

1. Dr. B.S.N. Raju, *Fundamentals of Air Pollution*, Oxford & I.B.H, 1st edition, 2017
2. Nevers, *Air Pollution Control Engineering*, McGraw-Hill, Inc., 3rd edition, 2016
3. Rao, C. S., *Environmental Pollution Control Engineering*, New Age International, New Delhi, 4th edition, 2022
4. Noel, D. N., *Air Pollution Control Engineering*, Waveland Press, 3rd edition, 2016
5. Peavy H. S., Rowe D. R. and Tchobanoglous G., *Environmental Engineering*, McGraw Hill, New York, 7th edition, 2017

ONLINE LEARNING RESOURCES

https://archive.nptel.ac.in/courses/105/107/105107213/

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III B.Tech – I Sem.

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(23CE0155) ENVIRONMENTAL IMPACT ASSESSMENT
(Professional Elective – I)

COURSE OBJECTIVES

The objectives of this course is to

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 this course, students will be able to:

1. *Evaluate different EIA methods and use cost/benefit analysis to help in project decision-making.*
2. *Identify the impacts of developmental activities on land, water, air, and biological environment, and suggest suitable mitigation measures.*
3. *Understand the impacts of developmental activities and deforestation on vegetation and wildlife.*
4. *Apply the principles of environmental risk assessment to identify potential risks and suggest appropriate mitigation strategies.*
5. *Apply environmental audit procedures and analyze audit data to prepare a report in accordance with environmental regulations.*
6. *Analyze environmental rules, EIA steps, and ISO 14000 to understand how they help in pollution control and reporting.*

UNIT – I

Concepts and Methodologies of EIA: Initial Environmental Examination, Elements of EIA, - Factors Affecting EIA, Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters - Criteria for the Selection of EIA Methodology, EIA 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 Activities.

Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures

EIA 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. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies*, B.S.Publications, Hyderabad, 3rd edition, 2021
2. N.S. Raman, A.R.Gajbhiye, S.R.Khandeshwar, *Environmental Impact Assessment*, Tech Sar Pvt. Ltd., 2nd edition, 2014

REFERENCES

1. K. Suresh Dhaneja, *Environmental Science and Engineering*, S.K., Katania & Sons Publication, New Delhi 2011
2. V.S. Kulkarni, S.N. Kaul & R.K. Trivedy, *A Handbook of Environment Impact Assessment*, Scientific Publishers 2024
3. H. S. Peavy, Rowe, D. R, Tchobanoglous,G, *Environmental Engineering*, McGraw Hill International Editions, New York, 7th edition, 2017

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III B.Tech – I Sem.

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(23CE0122) GEOTECHNICAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course is to

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 soils to real-world geotechnical problems and design considerations.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Conduct tests to evaluate index properties of soils.*
2. *Perform sieve analysis to classify the soil based on IS classification system.*
3. *Determine coefficient of permeability of cohesive and cohesion less soils.*
4. *Draw compaction curve and figure out maximum dry density and optimum moisture content.*
5. *Conduct various lab and in-situ tests to determine shear strength of soil.*
6. *Conduct CBR test to design flexible pavements.*

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 Methods)
    c. Determination of Co-Efficient of Consolidation

d. Direct Shear Test in Cohesion Less Soil
e. Unconfined Compression Test in Cohesive Soil
f. Laboratory Vane Shear Test in Cohesive Soil
g. Tri-Axial Compression Test in Cohesion Less Soil
h. California Bearing Ratio Test

Any Ten experiments can be conducted

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

REFERENCES

1. Saibaba Reddy E., Ramasastri K., *Measurement of Engineering Properties of Soils,* New age International (P) limited publishers, New Delhi, 2010
2. G.Venkatappa Rao and Goutham K. Pothal, *Geosynthetic Testing – A laboratory Manual*, Sai Master Geoenvironmental Services Pvt. Ltd., 1st edition 2008.
3. Braja M. Das., *Soil Mechanics: Laboratory Manual*, Oxford University Press, 10th edition, 2022

ONLINE LEARNING RESOURCES

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

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III B.Tech – I Sem.

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(23CE0123) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

COURSE OBJECTIVES

The objectives of this course is to

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 behaviour.*
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 (COs)

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. *Determine Manning's and Chezy's constant for Open Channel Flow.*
4. *Analyze the impact of jets on vanes and its significance in hydraulic machinery.*
5. *Assess the performance of turbines under different conditions and recommend optimal operating parameters.*
6. *Evaluate the performance characteristics of single-stage and multistage centrifugal pumps under varying operating conditions.*

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.

REFERENCES

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/

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B.Tech-CE

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III B.Tech – I Sem.

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(23CE0124) ESTIMATION, SPECIFICATIONS, COSTING & VALUATION
(Skill Oriented Course)

COURSE OBJECTIVES

The objectives of this course is to

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 (COs)

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

1. *Estimate the quantities required for a simple and double storied building using Long Wall and Short Wall & Centre Line method.*
2. *Prepare abstract and detailed estimates for a building.*
3. *Perform rate analysis for various construction works.*
4. *Maintain M-Book and prepare bills.*
5. *Draft specification for various materials and works.*
6. *Valuation a building for its worth/ market rate.*

LIST OF ACTIVITIES

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 Govt 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 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

REFERENCES

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
https://www.coursera.org/learn/construction-cost-estimating

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(23EC0417) TINKERING LAB

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 this course

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

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1 *Demonstrate the ability to design and implement basic electronic circuits using breadboards and sen*
2 *Apply microcontroller programming and interfacing techniques for real-time applications.*
3 *Utilize 3D design and printing tools to develop mechanical prototypes.*
4 *Analyze environmental and biomedical parameters using appropriate sensors and design automation systems.*
5 *Implement AI/ML models for prediction, classification, and decision-making in smart systems.*
6 *Develop integrated smart systems for safety, automation, and resource optimization in real-world applications.*

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 ofyour 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 Sensorgy
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) Fire fighting 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.

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(23EE0261) ELECTRICAL SAFETY PRACTICES AND STANDARDS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course is to

1. *To understand the basic principles of electrical safety, effects of electric shock and hazards like arc and blast.*
2. *To learn about safety equipment, overvoltage protection, and fire prevention methods in electrical systems.*
3. *To gain knowledge of grounding practices, bonding methods, and maintaining safe distances in electrical environments.*
4. *To become familiar with electrical safety standards, regulations, and practical safety practices in various installations.*

COURSE OUTCOMES (COs)

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

1. *Understanding the Fundamentals of Electrical Safety. L2*
2. *Identifying and Applying Safety Components.L3*
3. *Analysing Grounding Practices and Electrical Bonding.L4*
4. *Applying Safety Practices in Electrical Installations and Environments.L4*
5. *Identify various national and international standards and statutory requirements related to electrical safety.L4*
6. *Compare and interpret the applications of different electrical safety codes and regulations.L4*

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 - Earthing 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-Case studies.

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 inspectorate

TEXT BOOKS

1. Massimo A.G.Mitolo, *Electrical Safety of Low-Voltage Systems*, McGraw Hill, USA, 2009.
2. Mohamed El-Sharkawi, *Electric Safety - Practice and Standards*, CRC Press, USA, 2014.

REFERENCES

1. Kenneth G.Mastrullo, Ray A. Jones, *The Electrical Safety Program Book*, 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*, Butterworth and Company, London, 1986.
4. John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, *Electrical Safety Hand book*, McGraw-Hill, New York, USA, 4th edition, 2012.

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III B.Tech – I Sem.

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(23ME0356) SUSTAINBLE ENERGY TECHNOLOGIES
(Open Elective - I)

COURSE OBJECTIVES

The objectives of the course are

1. *To demonstrate the importance the impact of solar radiation, solar PV modules*
2. *To understand the principles of storage in PV systems*
3. *To discuss solar energy storage systems and their applications.*
4. *To get knowledge in wind energy and bio-mass*
5. *To gain insights in geothermal energy, ocean energy and fuel cells.*

COURSE OUTCOMES (COs)

On successful completion of this course the student will be able to:

1. *Illustrate the importance of solar radiation and solar PV modules.*
2. *Discuss the storage methods in PV systems*
3. *Explain the solar energy storage for different applications*
4. *Understand the principles of wind energy, and bio-mass energy.*
5. *Attain knowledge in geothermal energy, ocean energy and fuel cells.*
6. *Explain the principles of sustainability and the environmental, social, economic aspects of energy use.*

UNIT – I

Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, Extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

UNIT – II

Solar PV Modules and PV Systems: PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance

Storage in PV Systems: Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT – III

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT – IV

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT – V

Geothermal Energy: Origin, Applications, Types of Geothermal Resources, Relative Merits.

Ocean Energy: Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges.

Fuel Cells: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

TEXT BOOKS

1. Sukhatme S.P. and J.K.Nayak, *Solar Energy: Principles of Thermal Collection and Storage*, TMH, 2008
2. Khan B.H, *Non-Conventional Energy Resources*, Tata McGraw Hill, New Delhi, 2006

REFERENCES

1. D.Yogi Goswami, Frank Krieth & John F Kreider, *Principles of Solar Engineering*, Taylor & Francis, 2000.
2. Ashok V Desai, *Non-Conventional Energy*, New Age International (P) Ltd, 1990
3. Ramesh & Kumar, *Renewable Energy Technologies,* Narosa publications, 2006
4. G.D Roy, *Non-conventional Energy Source*, Standard Publishers, 2012

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/112106318

https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-wIa2X-SuSiNy13

https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE r&si=Apfjx6oDfz1Rb_N3

https://youtu.be/zx04Kl8y4dE?si=VmOvp_OgqisILTAF

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(23EC0406) ELECTRONIC CIRCUITS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *To understand semiconductor diodes, their characteristics and applications.*
2. *To explore the operation, configurations, and biasing of BJTs.*
3. *To study the operation, analysis, and coupling techniques of BJT amplifiers.*
4. *To learn the operation, applications and uses of feedback amplifiers and oscillators.*
5. *To analyze the characteristics, configurations, and applications of operational amplifiers.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Explain the operation and characteristics of PN junction diodes and special-purpose diodes such as Zener, Tunnel, LED, Varactor, and Photodiode.*
2. *Analyze the behaviour of rectifier circuits (half-wave, full-wave, and bridge) with and without filters, and describe clipping and clamping circuits.*
3. *Demonstrate the operation of Bipolar Junction Transistors in different configurations and evaluate suitable biasing techniques for amplifier stability.*
4. *Compare the performance of single and multistage amplifiers using different coupling methods and analyse the simplified hybrid model in CE, CB, and CC configurations.*
5. *Classify feedback amplifiers and oscillators, and construct basic RC and LC oscillator circuits to meet required oscillation conditions.*
6. *Apply operational amplifier concepts to design and implement analog signal processing applications such as summing amplifiers, integrators, differentiators, and comparators.*

UNIT – I

Semiconductor Diode and Applications: Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Varactor Diode, Photo Diode.

UNIT – II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing

and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

UNIT – III

Single stage amplifiers: Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.

Multistage amplifiers: Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier; Multistage RC coupled BJT amplifier (Qualitative treatment only).

UNIT – IV

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).

Oscillators: Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge Oscillator.

UNIT – V

Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp: Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

TEXT BOOKS

1. J.Millman and Christos. C. Halkias, *Electronics Devices and Circuits,* Tata McGraw Hill, 3rd edition, 2006.
2. David A. Bell, *Electronics Devices and Circuits Theory,* Oxford University press, 5th edition, 2008.

REFERENCES

1. R.L.Boylestad, Lousis Nashelsky and K.Lal Kishore, *Electronics Devices and Circuits Theory*, Pearson, 12th edition, 2006.
2. N.Salivahanan, and N.Suresh Kumar, *Electronic Devices and Circuits,* TMH, 3rd edition, 2012
3. S.Sedra and K.C.Smith, *Microelectronic Circuits,* Oxford University Press, 5th edition.

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(23CS0553) JAVA PROGRAMMING
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.*
2. *Learn how to extend Java classes with inheritance and dynamic binding and how to use exception*
3. *Handling in Java applications*
4. *Understand how to design applications with threads in Java*
5. *Understand how to use Java apis for program development*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the Java language components for implementing control statements.*
2. *Apply the concepts of OOP's fundamentals like classes, Methods and class libraries to develop applications*
3. *Apply the concepts of arrays, inheritance develop efficient java applications.*
4. *Analyze the interfaces for implementing multiple inheritances.*
5. *Evaluate the concepts of packages, file I/O, by using access control, and exception handling mechanisms to solve real world scenarios*
6. *Create the GUI applications by using concepts like multi-threading, Java FX, JDBC*

UNIT - I

Object Oriented Programming: Basic concepts, Principles

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT - II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT - III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT - IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java.

UNIT - V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

TEXT BOOKS

1. Anitha Seth, B.L.Juneja, *JAVA one step ahead,* Oxford.
2. Debasis Samanta, Monalisa Sarma, *Joy with JAVA, Fundamentals of Object Oriented Programming,* Cambridge, 2023.
3. Paul Deitel, Harvey Deitel, *JAVA for Programmers,* Pearson, 4th edition.

REFERENCES

1. Herbert Schildt, *The complete Reference Java,* TMH, 11th edition
2. Y Daniel Liang, *Introduction to Java programming,* Pearson, 7th edition

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/106/105/106105191/

https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – I Sem.

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(23CS0554) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE
(Open Elective - I)

COURSE OBJECTIVES

This course is designed to:

1. *The student should be made to study the concepts of Artificial Intelligence.*
2. *The student should be made to learn the methods of solving problems using Artificial Intelligence.*
3. *The student should be made to introduce the concepts of Expert Systems.*
4. *To understand the applications of AI, namely game playing, theorem proving, and machine learning.*
5. *To learn different knowledge representation techniques*

COURSE OUTCOMES (COs)

After completion of the course, students will be able to

1. *Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.*
2. *Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.*
3. *Learn different knowledge representation techniques.*
4. *Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.*
5. *Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.*
6. *Analyze Supervised Learning Vs. Learning Decision Trees*

UNIT – I

Introduction to AI: Intelligent Agents, Problem-Solving Agents,
Searching for Solutions: Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT – II

Games: Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, **Logic:** Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT – III

First-Order Logic: Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT – IV

Planning: Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning

UNIT – V

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes‘ Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

TEXT BOOKS

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education, Third Edition.

REFERENCES

1. E. Rich and K. Knight, *Artificial Intelligence,* TMH, 3rd edition.
2. Patrick Henny Winston, *Artificial Intelligence,* Pearson Education, 3rd edition.
3. Shivani Goel, *Artificial Intelligence,* Pearson Education.
4. Patterson, *Artificial Intelligence and Expert systems,* Pearson Education.

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(23CS0555) QUANTUM TECHNOLOGIES AND APPLICATIONS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

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

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Explain core quantum principles in a non-mathematical manner.*
2. *Compare classical and quantum information systems.*
3. *Identify theoretical issues in building quantum computers.*
4. *Discuss quantum communication and computing concepts.*
5. *Recognize applications, industry trends, and career paths in quantum technology.*
6. *Societal & ethical implications of quantum technologies*

UNIT – I

Classical Vs Quantum Paradigm, Postulates of Quantum Mechanics, Wave function and Schrödinger Equation (Time-independent), Quantum states, Superposition, Qubits, Measurement, Operators, and Observables, Entanglement and Non-locality

UNIT – II

Qubits and Bloch Sphere, Quantum Logic Gates: Pauli, Hadamard, CNOT, and Universal Gates

Quantum Circuits Basic Algorithms: Deutsch-Jozsa. Gover‘s, Shor‘s (conceptual), Error Correction and Decoherence clauses.

UNIT – III

Teleportation & No-Cloning, BB84 Protocol, Quantum Networks & Repeaters, Classical vs Quantum Cryptography, Challenges in Implementation

UNIT – IV

Quantum Sensing: Principles and Technologies, Quantum-enhanced Measurements, Atomic Clocks, Gravimeters, Magnetometers, NV Centers, Industrial Applications

UNIT – V

Quantum Materials: Superconductors, Topological Insulators

Quantum Devices: Qubits, Josephson Junctions, National Quantum Missions (India, EU, USA, China), Quantum Careers and Industry Initiatives

TEXT BOOKS

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach,* Pearson Education, Third edition.

REFERENCES

1. E. Rich and K. Knight, **Artificial Intelligence,** TMH, 3rd edition.
2. Patrick Henny Winston, *Artificial Intelligence,* Pearson Education, 3rd edition.
3. Shivani Goel, *Artificial Intelligence,* Pearson Education.
4. Patterson, *Artificial Intelligence and Expert systems,* Pearson Education.

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(23HS0855) MATHEMATICS FOR MACHINE LEARNING AND AI
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.*
2. *To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.*
3. *To equip students with optimization techniques and graph-based methods used in AI applications.*
4. *To develop critical problem-solving skills for analysing mathematical formulations in AI/ML.*

COURSE OUTCOMES (COs)

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

1. *Apply linear algebra concepts to ML techniques like PCA and regression.*
2. *Analyze probabilistic models and statistical methods for AI applications.*
3. *Implement optimization techniques for machine learning algorithms*
4. *Apply the fundamental concepts of Gradient Descent in machine learning to choose the right optimization algorithm*
5. *Utilize vector calculus and transformations in AI-based models.*
6. *Develop graph-based AI models using mathematical representations.*

UNIT – I

Linear Algebra for Machine Learning: Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigenvalues, eigenvectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT – II

Probability and Statistics for AI: Probability distributions: Gaussian, Binomial, Poisson. Bayes‘ Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP).Entropy and Kullback-Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT – III

Optimization Techniques for ML: Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization: Lagrange multipliers and KKT conditions - Gradient Descent and its variants (Momentum, Adam) Newton‘s method, BFGS method.

UNIT – IV

Vector Calculus & Transformations: Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT – V

Graph Theory for AI

Graph representations: Adjacency Matrices, Laplacian Matrices. Bayesian Networks & Probabilistic Graphical Models - Introduction to Graph Neural Networks (GNNs)

TEXT BOOKS

1. Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, *Mathematics for Machine Learning,* Cambridge University Press, 2020.
2. Christopher Bishop, *Pattern Recognition and Machine Learning,* Springer

REFERENCES

1. Gilbert Strang, *Linear Algebra and its Applications,* Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, *Graph Theory and its Applications,* CRC Press, 2018.

WEB REFERENCES

1. MIT– Mathematics for Machine Learning https://ocw.mit.edu
2. Stanford CS229 – Machine Learning Course https://cs229.stanford.edu/
3. Deep AI–Mathematical Foundations for AI https://deepai.org

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III B.Tech – I Sem.

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(23HS0842) MATERIALS CHARACTERIZATION TECHNIQUES
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *To provide exposure to different characterization techniques.*
2. *To explain the basic principles and analysis of different spectroscopic techniques.*
3. *To elucidate the working of Scanning electron microscope - Principle, limitations and applications.*
4. *To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.*
5. *To educate the uses of advanced electric and magnetic instruments for characterization.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Analyze the crystal structure and crystallite size by various methods*
2. *Analyze the morphology of the sample by using a Scanning Electron Microscope.*
3. *Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope*
4. *Explain the differences between SEM and TEM*
5. *Explain the principle and experimental arrangement of various spectroscopic techniques*
6. *Identify the construction and working principle of various Electrical & Magnetic Characterization technique*

UNIT – I

Structure Analysis by Powder X-Ray Diffraction: Introduction, Bragg‘s law of diffraction, Powder X- Ray diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X- ray scattering (SAXS) (in brief).

UNIT – II

Microscopy Technique - 1 – Scanning Electron Microscopy (SEM): Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT – III

Microscopy Technique -2 - Transmission Electron Microscopy (TEM): Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy

UNIT – IV

Spectroscopy Techniques: Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT – V

Electrical & Magnetic Characterization Techniques: Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

TEXT BOOKS

1. Yang Leng, *Material Characterization: Introduction to Microscopic and Spectroscopic Methods,* John Wiley & Sons (Asia) Pvt. Ltd., 2013.
2. David Brandon, Wayne D Kalpan, *Microstructural Characterization of Materials,* John Wiley & Sons Ltd., 2008.

REFERENCES

1. Colin Neville Banwell and Elaine, M. McCash, *Fundamentals of Molecular Spectroscopy,* Tata McGraw-Hill, 4th edition, 2008.
2. Bernard Dennis Cullity & Stuart R Stocks, *Elements of X-ray diffraction,* Science, Prentice Hall, 2001.
3. Khalid Sultan, *Practical Guide to Materials Characterization: Techniques and Applications,* Wiley, 2021.
4. Sam Zhang, Lin Li, Ashok Kumar, *Materials Characterization Techniques,* CRC Press, 2008

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/115/103/115103030/
https://nptel.ac.in/content/syllabus_pdf/113106034.pdf
https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/

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B.Tech-CE

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III B.Tech – I Sem.

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(23HS0806) CHEMISTRY OF ENERGY SYSTEMS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
2. *To understand the basic concepts of processing and limitations of Fuel cells & their applications.*
3. *To impart knowledge to the students about fundamental concepts of photo chemical cells, reactions and applications.*
4. *Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.*
5. *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand the problems based on electrode potential and concept of batteries.*
2. *Apply fuel technology in various energy and engineering contexts.*
3. *Analyze the design and working mechanisms and applications of photo-electrochemical cells.*
4. *Analyze the advantages of photoelectric catalytic process such as high efficiency, low environmental impact and renewable energy applications. [L4]*
5. *Apply the electrochemical principles to photo voltaic cell, solar power and solar cells.*
6. *Analyze various methods for storage of hydrogen fuel.*

UNIT – I

Electro Chemical Systems: Galvanic cell, Electrolyte-types, Reference electrode, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries-Introduction, Lead-Acid, Nickel-Cadmium, Nickel-Metal Hydride batteries and their applications.

UNIT – II

Fuel Cells: Fuel cell - Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT – III

Photo and Photo Electrochemical Conversions: Photochemical cells Introduction and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT – IV

Solar Energy: Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT – V

Hydrogen Storage: Hydrogen fuel value and applications, Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, Other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel , and Organic hydrogen carriers.

TEXT BOOKS

1. Ira N. Levine, *Physical Chemistry*
2. Bahl and Bahl and Tuli, *Essentials of Physical Chemistry*.
3. Silver and Atkins, *Inorganic Chemistry*.

REFERENCES

1. US Department of Energy (EG&G technical services and corporation), *Fuel Cell Hand Book,* 7^{th} edition
2. Arvind Tiwari and Shyam, *Hand Book of Solar Energy and Applications*.
3. Klaus Jagar et.al., *Solar Energy Fundamental, Technology and Systems*
4. Levine Klebonoff, *Hydrogen storage*

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III B.Tech – I Sem.

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(23HS0821) ENGLISH FOR COMPETITIVE EXAMINATIONS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *To enable the students to learn about the structure of competitive English*
2. *To understand the grammatical aspects and identify the errors*
3. *To enhance verbal ability and identify the errors*
4. *To improve word power to answer competitive challenges*
5. *To make them ready to crack competitive exams*

COURSE OUTCOMES (COs)

By the end of the program students will be able to

1. *Identify the basics of English grammar and its importance*
2. *Explain the use of grammatical structures in sentences*
3. *Demonstrate the ability to use various concepts in grammar and vocabulary and their applications in everyday use and in competitive exams*
4. *Analyze an unknown passage and reach conclusions about it.*
5. *Choose the appropriate form of verbs in framing sentences*
6. *Develop speed reading and comprehending ability there by perform better in competitive exams*

UNIT – I

Grammar-1: Nouns – Classification – Errors – Pronouns – Types – Errors – Adjectives – Types – Errors – Articles – Definite – Indefinite - Degrees of Comparison – Adverbs – Types – Errors – Conjunctions – Usage – Prepositions – Usage - Tag Questions, Types - Identifying Errors - Practice.

UNIT – II

Grammar-2: Verbs-Tenses- Structure-Usages- Negatives- Positives- Time Adverbs-Sequence Of Tenses--If Clause-Voice-Active Voice And Passive Voice- Reported Speech-Agreement-Subject And Verb- Modals-Spotting Errors-Practices.

UNIT – III

Verbal Ability: Sentence Completion-Verbal Analogies-Word Groups-Instructions-Critical Reasoning-Verbal Deduction-Select Appropriate Pair-Reading Comprehension-Paragraph-Jumbles-Selecting the Proper Statement by reading a given Paragraph.

UNIT – IV

Reading Comprehension and Vocabulary: Competitive Vocabulary :Word Building – Memory Techniques-Synonyms, Antonyms, Affixes-Prefix & Suffix-One Word Substitutes-Compound Words-Phrasal Verbs-Idioms and Phrases-Homophones-Linking Words-Modifiers-Intensifiers - Mastering Competitive Vocabulary- Cracking The Unknowing Passage-Speed Reading Techniques- Skimming & Scanning-Types of Answering–Elimination Methods

UNIT – V

Writing for Competitive Examinations: Punctuation- Spelling Rules- Word Order-Sub Skills of Writing- Paragraph Meaning-Salient Features-Types - Note-Making, Note-Taking, Summarizing-Precise Writing- Paraphrasing- Expansion of Proverbs- Essay Writing-Types

TEXT BOOKS

1. Wren & Martin, *English for Competitive Examinations,* S. Chand & Co, 2021
2. *Objective English for Competitive Examination,* Tata McGraw Hill, New Delhi, 2014.

REFERENCES

1. Hari MohanPrasad, *Objective English for Competitive Examination,* Tata McGraw Hill, New Delhi, 2014.
2. Philip Sunil Solomon, *English for Success in Competitive Exams,* Oxford, 2016
3. Shalini Verma, *Word Power Made Handy,* S Chand Publications
4. Neira, Anjana Dev & Co., *Creative Writing: A Beginner's Manual,* Pearson Education India, 2008.
5. AbhishekJain, *Vocabulary Learning Techniques Vol. I & II,* R R Global Publishers, 2013.
6. MichelSwan, *Practical English Usage,* Oxford, 2006.

ONLINE LEARNING RESOURCES

https://www.grammar.cl/english/parts-of-speech.htm
https://academicguides.waldenu.edu/writingcenter/grammar/partsofspeech
https://learnenglish.britishcouncil.org/grammar/english-grammar-reference/active-passive-voice
https://languagetool.org/insights/post/verb-tenses/
https://www.britishcouncil.in/blog/best-free-english-learning-resources-british-council
https://www.careerride.com/post/social-essays-for-competitive-exams-586.aspx

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III B.Tech – I Sem.

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(23HS0822) ENTREPRENEURSHIP AND NEW VENTURE CREATION
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course

1. *To make the student understand about Entrepreneurship*
2. *To enable the student in knowing various sources of generating new ideas in setting up of New enterprise*
3. *To facilitate the student in knowing various sources of finance in starting up of a business*
4. *To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs*
5. *To encourage the student in creating and designing business plans*

COURSE OUTCOMES (COs)

By the end of the program students will be able to

1. *Understand core concepts and the importance of entrepreneurship.*
2. *Identify viable business opportunities using innovative techniques.*
3. *Prepare business plans and financial projections.*
4. *Gain knowledge of institutional and legal support for start-ups.*
5. *Apply entrepreneurial skills in real-time venture development.*
6. *Critically assess real-world case studies of successful Indian entrepreneurs to derive insights and best practices for sustainable business development.*

UNIT – I

Entrepreneurship: Introduction to Entrepreneurship, Definition and Meaning of Entrepreneurship, Characteristics and Functions of an Entrepreneur, Types of Entrepreneurs, Entrepreneur versus Intrapreneur, Innovation and Creativity in Entrepreneurship, Role of Entrepreneurship in Economic Development, Entrepreneurial Mindset & Motivation.

UNIT – II

Entrepreneurial Ideas: Idea Generation and Opportunity Identification, Sources of Business Ideas, Idea Screening and Evaluation, Feasibility Study – Technical, Financial, Market, and Legal Feasibility, Business Model Canvas, Design Thinking in Entrepreneurship, Protecting Ideas: Intellectual Property Rights (IPR), Patents, Trademarks.

UNIT – III

New Venture Creation: Steps in New Venture Creation, Business Plan Preparation, Executive Summary, Market Analysis, Marketing Plan, Operational Plan, Financial Plan, Funding Sources:,

Angel Investors, Venture Capitalists, Incubators & Accelerators, Bank Loans & Government Schemes (like Start-up India, MSME)

UNIT – IV

Entrepreneurial Ecosystem & Legal Framework: Institutional Support Systems: MSME, SIDBI, NABARD, TBI, DST, Entrepreneurship Development Institutes (EDIs), Startup Policy in India and State Policies, Legal Formalities for Starting a Venture, Company Registration and Types (Proprietorship, Partnership, LLP, Pvt. Ltd.), Taxation and Compliances (GST, TDS basics)

UNIT – V

Managing and Growing the Venture: Entrepreneurial Marketing, and Financial Management for Entrepreneurs, Risk Management and Exit Strategies, Scaling Up: Strategies for Growth, Social and Women Entrepreneurship, Case Studies of Successful Indian Entrepreneurs

TEXT BOOKS

1. D F Kuratko and T V Rao, *"Entrepreneurship" - A South-Asian Perspective,* Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2. Nandan H, *Fundamentals of Entrepreneurship,* PHI, 2013
3. Vasant Desai, *Dynamics of Entrepreneurial Development and Management*
4. S.S. Khanka, *Entrepreneurial Development*
5. David H. Holt, *Entrepreneurship: New Venture Creation*
6. Hisrich, Peters, Shepherd, *Entrepreneurship*

REFERENCES

1. Vasant Desai, *Small Scale Industries and Entrepreneurship,* Himalaya Publishing 2012.
2. Rajeev Roy, *Entrepreneurship,* Oxford, 2nd edition, 2012.
3. B.Janakiram and M.Rizwanal, *Entrepreneurship Development: Text & Cases,* Excel Books, 2011.
4. Stuart Read, Effectual, *Entrepreneurship,* Routledge, 2013.

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B.Tech-CE

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III B.Tech – II Sem.

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(23CE0125) DESIGN OF STEEL STRUCTURES

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the properties, types, and applications of structural steel in construction.*
2. *Analyze the behaviour 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 (COs)

On successful completion of this course, the student will be able to

1. *Design for simple and eccentric bolted and welded connection.*
2. *Design tension and compression members, including built-up sections and column bases.*
3. *Design laterally supported and unsupported beams.*
4. *Design built-up beams and plate girders.*
5. *Design roof truss & purlins with angle and channel sections.*
6. *Analyze and design continuous beam and portal frame using plastic design approach.*

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 Lacings 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, 3rd edition, 2019.
2. Bhavikatti S.S, *Design of Steel Structures,* IK International Publishing House, New Delhi, 2017.

REFERENCES

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. Subramanian N, *Design of Steel Structures,* Oxford University Press, New Delhi, 2018.
4. IS 800:2007 Codebook on "General Construction in Steel – Code of Practice".

ONLINE LEARNING RESOURCES

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

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III B.Tech – II Sem.

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(23CE0126) HIGHWAY ENGINEERING

COURSE OBJECTIVES

The objectives of this course is to

1. *Interpret the history, importance, and planning aspects of highway development in India.*
2. *Apply geometric design principles for highway alignment, super elevation, sight distance, and curves.*
3. *Analyze traffic characteristics, capacity, level of service, and road safety measures.*
4. *Design and optimize intersection layouts to improve traffic flow, capacity, and safety.*
5. *Analyze the stresses and design the flexible and rigid pavement along with joints in CC pavements.*

COURSE OUTCOMES (COs)

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

1. *Analyze the planning aspects of highway development in India.*
2. *Design of highway alignment, super elevation, sight distances, and both horizontal and vertical curves.*
3. *Analyze traffic volume and speed data to assess highway capacity and influencing factors, using proper data collection and presentation methods.*
4. *Interpret road accident data and suggest preventive measures using condition and collision diagrams.*
5. *Design and optimize intersection layouts to improve traffic flow, efficiency, and accident prevention.*
6. *Design flexible and rigid pavements as per IRC guidelines.*

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. S.K.Khanna & C.E.G.Justo, *Highway Engineering*, Nemchand & Bros., 10th edition, 2019
2. C.Venkatramaiah, *Transportation Engineering, Volume I*, Universities Press, 2015

REFERENCES

1. L.R.Kadiyali, *Principles of Highway Engineering*, Khanna Publishers
2. L.R.Kadiyali and Lal, *Traffic Engineering and Transportation Planning*, Khanna Publications, 9th Edition
3. Dr. S.K.Sharma, *Highway Engineering*, S.Chand Publishers, 2014

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0127) ENVIRONMENTAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course is to

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, storm water drainage, and plumbing networks.
5. Evaluate sewage treatment, sludge management, and water reuse methods.

COURSE OUTCOMES (COs)

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

1. Estimate demand for water and conduct tests to access the suitability of water for drinking purpose.
2. Design various basic and advanced water treatment units and plants
3. Design pipeline network systems
4. Maintain various pipe fitting in the distribution system
5. Estimate the quantity of sewage flow and perform sewer design
6. Design primary and secondary sewage treatment units and plants

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 - Waterborne 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 - Clari-flocculator- 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, Analysis of Distribution Systems, 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. Santhosh Kumar Garg, *Environmental Engineering*, Volume I and II, Khanna Publications, 37th edition, 2024
2. B.C. Punmia, *Environmental Engineering*, Volume I and II, Standard Publications, 2005

REFERENCES

1. H. S Peavy, D. R. Rowe, G. Tchobanoglous, *Environmental Engineering*, McGraw Hill Education (India) Pvt Ltd, 2017.
2. C S Rao, *Environmental Pollution and Control Engineering*, New Age International, 2021
3. Metcalf and Eddy, *Waste Water Engineering*, McGraw Hill, 2015.
4. D. P. Sincero and G.A Sincero, *Environmental Engineering*, Pearson 2015.
5. Mark J Hammar and Mark J.Hammar Jr.Wiley, *Water and Waste Water Technology*, Pearson Hall, 2007.

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/103107084

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0128) DESIGN OF EARTHQUAKE RESISTANT STRUCTURES
(Professional Elective - II)

COURSE OBJECTIVES

The objectives of this course is to

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)

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

1. *Understand the concepts of engineering seismology and analyse the behaviour of single-degree-of-freedom vibratory systems under various dynamic conditions including earthquake ground motions.*
2. *Design of earthquake resistant structures by considering earthquake loads, load combinations and permissible stresses.*
3. *Develop structural models for framed buildings.*
4. *Design lateral load resisting system in RC buildings to withstand seismic forces effectively.*
5. *Evaluate the seismic behaviour of unreinforced and reinforced masonry structures and apply design principles to improve their earthquake resistance.*
6. *Design structural and non-structural elements of reinforced concrete buildings with effective ductility considerations.*

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 deign 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 IS 1893 (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 - Behaviour of walls - Box action and bands - Behaviour of infill walls - Improving Seismic behaviour of masonry buildings - Load combinations 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. S. K. Duggal, *Earthquake Resistant Design of Structures,* Oxford University Press, Second edition, 2014
2. PankajAgarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures,* Prentice Hall of India Pvt. Ltd., Eastern Economy edition, 2011

REFERENCES

1. T. Paulay and M.J.N. Priestly, *Seismic Design of Reinforced Concrete and Masonry Building*, John Wiley & Sons.
2. Vinod Hosur, *Earthquake Resistant Design of Building Structures*, Wiley India Pvt. Ltd.
3. R.N.Iyengar, *Elements of Mechanical Vibration,* I.K.International Publishing House Pvt. Ltd.
4. Anand S.Arya, *Masonry and Timber Structures including Earthquake Resistant Design,* Nemchand & Bros
5. BIS Codes:
   1. IS 1893(Part-1):2016 or Latest codes;.
   2. IS 13920:2016.
   3. IS 4326.
   4. IS 456:2000 or latest.

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/105107204

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B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0129) OPEN CHANNEL FLOW
(Professional Elective - II)

COURSE OBJECTIVES

The objectives of this course is 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. *Evaluate basic ideas of fluid flow in networks and pipe lines in both steady and unstable situations.*
2. *Use theoretical and computational methods to address issues pertaining to consistent and variable flow in open channels.*
3. *Assess the effects of unstable flow phenomena, like open channel surges.*
4. *Assess how unstable flow phenomena, such dam breaks, affect open channels.*
5. *Analyze the processes of sediment transport and how they affect the hydraulic systems and morphology of rivers.*
6. *Design hydraulic models for fluid mechanics applications including physical modeling and flow monitoring.*

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 - Introduction to Hec-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 - Bed forms - Bed Load Suspended Load - total Sediment Transport - Design of Stable Channels and Regime Channels - Reservoir Sedimentation and Trap Efficiency

UNIT – V

Flow Measurements 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. Subramanya K, *Flow in Open Channels,* The Tata McGraw Hill Company, Delhi, 5th edition, 2019
2. Chow, V.T, *Open Channel Hydraulics,* The Tata McGraw Hill Company, N York, 3rd edition, 2021

REFERENCES

1**.** French, R.H, *Open Channel Hydraulics,* The Tata McGraw Hill Company, N York, 1986
2. Terry Sturm, *Open Channel Hydraulics,* The Tata McGraw Hill Company, Delhi, 2011
3. Rajesh Srivastava, *Flow through Open Channel,* Oxford Univ. Press. N Delhi, 2011

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III B.Tech – II Sem.

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(23CE0130) FOUNDATION ENGINEERING
(Professional Elective – II)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the need for soil exploration and various methods used in site investigations.*
2. *Evaluate the bearing capacity and settlement characteristics of shallow foundations.*
3. *Assess the load-carrying capacity and settlement of deep foundations, including pile and well foundations.*
4. *Analyze the stability of slopes under different conditions using various stability methods.*
5. *Apply earth pressure theories to analyse retaining walls and soil pressures.*

COURSE OUTCOMES (COs)

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

1. *Apply the methods of soil exploration, field testing, and preparation of Soil Investigation Report*
2. *Analyze infinite and finite earth slopes*
3. *Determine earth pressure using theoretical and graphical methods*
4. *Perform stability analysis of Retaining Walls*
5. *Determine bearing capacity and allowable bearing pressure of soil using theoretical and in-situ testing*
6. *Determine bearing capacity of pile foundation by using static pile formulae, dynamic pile formulae and in-situ testing and perform settlement analysis for pile foundation and Supervision for sinking of well foundation*

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

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 – III

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

R**etaining Walls:** Types of Retaining Walls - Stability of Retaining Walls

UNIT – IV

Shallow Foundations: Types - Choice of Foundation - Location of Depth - Safe Bearing Capacity - Terzaghi`s, Meyerhof’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 – V

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

TEXT BOOKS

1. C.Venkataramaiah, *Geotechnical Engineering*, New Age Publications, 6th edition, 2018.
2. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7th edition, 2022

REFRENCES

1. Purushtoman Raj, *Soil Mechanics and Foundation Engineering,* Pearson Publications, 2nd edition, 2013
2. Das B.M., *Principles of Foundation Engineering*, Cengage Learning Publications, 10th edition, 2024
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundations* Laxmi Publications Pvt. Ltd, New Delhi, 18th edition, 2023
4. Varghese, P.C, *Foundation Engineering*, Prentice Hall of India, New Delhi, 2005
5. V.N.S.Murthy, *Foundation Engineering*, CRC Press, New Delhi, 2002

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/105105176

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0131) COST EFFECTIVE HOUSING TECHNIQUES
(Professional Elective – III)

COURSE OBJECTIVES

The objectives of this course is 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)

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

1. *Develop plans for land use and housing finance to construct cost-effective dwellings for the urban poor.*
2. *Evaluate suitable low-cost resilient housing solutions for a given situation.*
3. *Recommend suitable cost-effective substitute materials for scarce materials.*
4. *Plan appropriate infrastructure services for drinking water, safe sanitation and energy needs in low-cost housing.*
5. *Implement various rural housing techniques, modify by rendering them safer and more economical*
6. *Repairs and restore non-engineered buildings that are affected due to disaster.*

UNIT – I

a) **Housing Scenario**: Introducing - Status of Urban Housing - Status of Rural Housing

b) **Housing Finance:** Introducing - Existing Finance System in India - Government Role as Facilitator - Status at Rural Housing Finance - Impenitently 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 Lass - 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 Rooting/Flooring Systems - Economical Wall System - Single Brick Thick Loading 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 Railways of Non-Engineered Buildings - Repair and Restore Action of Earthquake Damaged Non-Engineered Buildings Recommendations for Future Constructions. Requirements of 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. Uday Chatterjee, Arindam Biswas, Jenia Mukherjee, Dinabandhu Mahata, *Sustainable Urbanism in Developing Countries,* Taylor & Francis / Routledge Publishing, 1st edition, 2024
2. A.K. Jain, *Housing for All: Design, Construction and Management*, Khanna Publishing, 1st edition, 2023

REFERENCES

1. A.K.Lal, *Hand book of Low Cost Housing,* New Age International Publishers, 2nd edition, 2011
2. Neville A.M., *Properties of Concrete*, Pearson Publishing Limited, 6th edition, 2014

ONLINE LEARNING RESOURCES

https://archive.nptel.ac.in/courses/124107001/

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III B.Tech – II Sem.

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(23CE0132) WATERSHED MANAGEMENT
(Professional Elective – III)

COURSE OBJECTIVES

The objectives of this course is 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 ground water 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 foot print concepts to ensure sustainable water resource utilization.*

COURSE OUTCOMES (Cos)

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

1. *Analyze the principles of watershed management, pollution prevention techniques, and environmental regulations pertaining to water quality.*
2. *Assess sediment transport models, wetland water budgets, and erosion processes to determine the necessity for conservation and the extent of land degradation.*
3. *Analyze groundwater and surface water interactions to manage water resources holistically.*
4. *Analyze hydrological models and the effectiveness of wetland treatment for integrated water resource management.*
5. *Apply water harvesting methods, hydrologic modeling, and wetland design strategies for sustainable watershed management.*
6. *Examine drought mitigation measures, irrigation water management techniques, and the water footprint's contribution to agricultural sustainability*

UNIT – I

Introduction to Watershed: 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 Semiarid 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

Soil Erosion and Wetland: 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, Evapotranspiration.

UNIT – III

Surface Water Flows and Wetland: Surface Water Flows: Structures and Channels, Groundwater-Surface Water Exchange in Wetlands, Surface Water Flows Ii and Wetland Hydrology Case Studies, Flow and Mixing in Wetlands Wetland Water Quality Information: Nutrients, Organic/Inorganic Contaminants, Sediments and Colloids, Wetland Transport Models I: Plug Flow, Cstrs and Cstrs in Series; Intro to Method of Moments.

UNIT – IV

Wetland and Rain Water Harvesting: Wetland Hydrologic Assessment: Physical and Biological Processes, Anthropogenic and Climate Change Impacts On Wetland Hydrology, Modelling 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 and Water Foot Print: 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 Foot Print 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. Murthy, *Watershed Management,* New Age International, 2nd edition, 2021

REFERENCES

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, 4th edition, 2012
3. 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

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0133) ADVANCED STRUCTURAL ANALYSIS
(Professional Elective – III)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamental concepts of arches, including three-hinged and two hinged arches, and analyse the effects of horizontal thrust, bending moment, normal thrust, and radial shear.*
2. *Apply the moment distribution method to analyse single-bay, single-story portal frames with and without side sway.*
3. *Analyze continuous beams and portal frames using Kani's Method, including cases with and without settlement of supports.*
4. *Solve structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects.*
5. *Evaluate the stiffness method for analysing 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:

1. *Analyze two-hinged & three-hinged arches.*
2. *Analyze portal frames using moment distribution method & substitute frame analysis*
3. *Analyze continuous beams using Kani's Method.*
4. *Analyze portal frames using Kani's Method.*
5. *Analyze continuous beams and portal frames using flexibility method.*
6. *Analyze continuous beams and portal frames using stiffness method.*

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. Bhavikatti, S.S, *Structural Analysis-Vol. I,* Vikas Publishing Pvt Ltd., New Delhi, 5th edition, 2021
2. Bhavikatti, S.S, *Structural Analysis-Vol. II*, Vikas Publishing Pvt Ltd., New Delhi, 5th edition, 2021

REFERENCES

1. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, *Theory of Structures*, Laxmi Publications Pvt. Ltd., New Delhi, 2017
2. Vaidyanadhan, R and Perumal P, *Comprehensive Structural Analysis* – Vol. 1 & Vol. 2, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
3. L.S. Negi & R.S. Jangid, *Structural Analysis*, Tata McGraw Hill Publications, New Delhi, 6th edition, 2003.
4. R. C. Hibbeler, *Structural Analysis*, Pearson Education, Ninth edition, 2017.
5. Devdas Menon- *Structural Analysis*, Alpha Science International Limited, 2010.

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III B.Tech – II Sem.

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(23CE0134) HIGHWAY ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course is to

1. *Analyze the strength, durability, and performance characteristics of pavement materials.*
2. *Assess the quality and compliance of highway materials with standard specifications.*
3. *Develop hands-on skills for material testing and interpretation of test results.*
4. *Understand the properties and behaviour of aggregates and bitumen used in highway construction.*
5. *Perform standard laboratory tests on aggregates and bitumen to evaluate their suitability for road construction.*

COURSE OUTCOMES (COs)

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

1. *Determine the mechanical properties of aggregates, including abrasion resistance, impact strength, and crushing value.*
2. *Interpret test results to assess the suitability of aggregates and shape characteristics for pavement construction*
3. *Determine the physical properties of coarse aggregates, such as specific gravity and water absorption.*
4. *Analyze the physical properties of bituminous materials through standard tests.*
5. *Assess bitumen performance by evaluating its softening point and ductility.*
6. *Evaluate bitumen quality using loss on heating and extraction tests.*

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
7. Determination of Water Absorption Capacity of the Coarse Aggregate Sample.

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

TEXT BOOKS

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

REFERENCES

1. IS 383:1993 - Specification for Coarse and Fine Aggregates from Natural Sources for Concrete
2. 1S 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 Marshalls Mix design,* 2002

ONLINE LEARNING RESOURCES

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

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(AUTONOMOUS)

III B.Tech – II Sem.

L	T	P	C
0	0	3	1.5

(23CE0135) ENVIRONMENTAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course are to make the student to:

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 (COs)

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

1. *Assess appropriate sampling and preservation methods for water and wastewater analysis*
2. *Analyze water quality parameters and determine fluoride, iron and sulphate using appropriate instruments and methods.*
3. *Analyze optimum coagulant dosage using the jar test apparatus for effective water treatment.*
4. *Estimate critical wastewater characteristics including suspended solids, volatile and fixed solids, and sludge volume index to assess treatment requirements.*
5. *Assess biological parameters such as Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD) to determine organic pollution in wastewater.*
6. *Identify nitrogen-based pollutants and microbiological contaminants (e.g., total and fecal coliform) in wastewater to understand the extent of pollution and necessary treatment strategies.*

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 (Demo)
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 waste water
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.

REFERENCES

1. Dr. S.K. Panigrahi, L. Mohanty, S.K. Kataria & Sons, *Environmental Engineering Laboratory Manual*
2. *Standard Methods for the Examination of Water and Wastewater*, A.P.H.A., American Public Health Association
3. Lab Manual, *ISO 14001 Environmental Management*, Regulatory Standards for Drinking Water and Sewage disposal
4. Dr.G. Kotaiah and Dr.N. Kumara Swamy, *Environmental Engineering Lab Manual*, Charotar Publishers

ONLINE LEARNING RESOURCES

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

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(AUTONOMOUS)

III B.Tech – II Sem.

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(23CE0136) BUILDING INFORMATION MODELLING
(Skill Oriented Course)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamentals of Building Information Modelling(BIM) and Autodesk Revit.*
2. *Develop proficiency in Revit's basic drawing and editing tools for structural and architectural modelling.*
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 (COs)

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

1. *Create a project using AUTODESK REVIT and can work with basic drawing and editing tools*
2. *Import and link CAD files and can setup levels and grids*
3. *Model walls, floors, ceilings, roofs and stairs*
4. *Work with doors, windows and curtain walls*
5. *Work with various view options*
6. *Add, modify and work with components.*

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 - Modelling Walls, Modifying Walls, Model Exterior Shell, Add 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 Grid
7. WORKING WITH VIEWS - Setting the View Display, Duplicating Views, Adding Callout Views, Elevations and Sections.

8. ADDING COMPONENTS - Adding Component, Modifying Component, Working With Elements.
9. MODELING FLOORS - Modelling& Modifying Floors, Joining Geometry, Creating Shaft Openings, Creating Sloped Floors
10. MODELING CEILINGS & ROOFS - Modelling Ceilings, Adding Ceiling Fixtures, Creating Ceiling Soffits, Modelling Roofs
11. MODELING STAIRS AND RAILING - 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, 2008
2. Wing, Eric. *Autodesk Revit Architecture 2017*: No Experience Required. Indianapolis: John Wiley & Sons, 2019

REFERENCES

1. Kim, Marcus, Lance Kirby, and Eddy Krygiel, *Mastering Autodesk Revit 2017 for architecture*. INpolis, IN: John Wiley & Sons, 1st edition, 2019.
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*, ICE Publishing, 1st edition, 2014.
4. Chuck Eastman, Paul Teicholz, Rafael Sacks and Kathleen Liston, *BIM Handbook: A Guide to Building Information Modelling for Owners, Managers, Designers, Engineers and Contractors*, John Wiley & Sons, 2008.

ONLINE LEARNING RESOURCES

https://minnodillc.com/building-information-modeling-bim/

https://www.skyfilabs.com/online-courses/building-information-modelling-course

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

III B.Tech – II Sem.

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2	0	0	-

(23HS0816) TECHNICAL PAPER WRITING & IPR
(Mandatory Non-credit Course)

COURSE OBJECTIVES

The objectives of this course:

1. *To enable the students to practice the basics kills of research paper writing*
2. *To make the students understand the importance of IP and to educate the basic concepts of Intellectual Property Rights.*
3. *To practice the basics kills 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 (COs)

By the end of the program students will be able to

1. *Identify key secondary literature related to their proposed technical paper writing. [L1,L2]*
2. *Explain various principles and styles in technical writing [L1,L2]*
3. *Use the acquired knowledge in writing a research/technical paper[L3]*
4. *Analyze rights and responsibilities of holder of Patent, Copy right, trade mark, International Trademark etc.[L4]*
5. *Evaluate different forms of IPR available at national & international level [L5]*
6. *Develop skill of making research of various forms of IPR by using modern tools and techniques.[L3, L6]*

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: Purpose and Function of Trade-Marks, Acquisition of Trade-Mark Rights, Protectable Matter, Selecting Evaluating Trade Mark and Trade Mark Registration Processes.

UNIT – V

Law of Copy Rights: Fundamentals of Copy Right Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copy Right Ownership Issues, Copy Right 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 and Intellectual Property Audits

TEXT BOOKS

1. Deborah. E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013.
2. Meenakshi Raman, Sangeeta Sharma. *Technical Communication: Principles and Practices.* Oxford.

REFERENCES

1. R. Myneni, *Law of Intellectual Property*, Asia law House, 9th edition, 2019.
2. Prabuddha Ganguli, *Intellectual Property Rights* Tata McGraw Hill, 2001
3. P. Naryan, *Intellectual Property Law*, Eastern Law House, 3rd edition, 2007.
4. Adrian Wall work. *English for Writing Research Papers*, Springer Cham Heidelberg New York, Second Edition, 2016.
5. Dan Jones, Sam Dragga, *Technical Writing Style.*

ONLINE RESOURCES

https://theconceptwriters.com.pk/principles-of-technical-writing/
https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/
https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
https://lawbhoomi.com/intellectual-property-rights-notes/
https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf

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(AUTONOMOUS)

III B.Tech – II Sem.

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3	0	0	3

(23EE0262) RENEWABLE ENERGY SOURCES
(Open Elective-II)

COURSE OBJECTIVES

The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies*

UNIT-I

Solar Energy: Solar radiation - beam and diffuse radiation, solar constant, Sun at Zenith, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

UNIT-II

PV Energy Systems: Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Solar PV modules from solar cells, mismatch in series and parallel connections design and structure of PV modules, Electrical characteristics of silicon PV cells and modules, Stand-alone PV system configuration, Grid connected PV systems.

UNIT-III

Wind Energy: Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades; wind data and energy estimation and site selection considerations.

UNIT-IV

Geothermal Energy: Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo- pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India

UNIT-V

Miscellaneous Energy Technologies: Ocean Energy: Tidal Energy-Principle of working, Operation methods, advantages and limitations. Wave Energy-Principle of working, energy and power from waves, wave energy conversion devices, advantages and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

TEXT BOOKS

1. G. D. Rai, *Non-Conventional Energy Sources*‖, Khanna Publishers, 4th edition, 2000.
2. Chetan Singh Solanki, *Solar Photovoltaics fundamentals technologies and applications*, PHI Learning Private Limited, 2nd edition 2012.

REFERENCES

1. Stephen Peake, *Renewable Energy Power for a Sustainable Future*, Oxford International edition, 2018.
2. S. P. Sukhatme, *Solar Energy*, Tata Mc Graw Hill Education Pvt. Ltd, 3rd edition, 2008.
3. B H Khan, *Non-Conventional Energy Resources*, Tata Mc Graw Hill Education Pvt Ltd, 2nd edition, 2011.
4. S. Hasan Saeed and D.K.Sharma, *Non-Conventional Energy Resources*, S.K.Kataria & Sons, 3rd edition, 2012.
5. G. N. Tiwari and M.K.Ghosal, *Renewable Energy Resource: Basic Principles and Application*, Narosa Publishing House, 2004.

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/103103206

https://nptel.ac.in/courses/108108078

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B.Tech-CE

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(AUTONOMOUS)

III B.Tech – II Sem.

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3	0	0	3

(23ME0349) AUTOMATION AND ROBOTICS
(Open Elective-II)

COURSE OBJECTIVES

The objectives of the course are to

1. *Fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes.*
2. *Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation.*
3. *Knowledge of industrial automation and robotics, sensors, and end-effector design for modern manufacturing environments.*
4. *Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications.*
5. *Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.*

COURSE OUTCOMES (COs)

On successful completion of this course the student will be able to

1. *Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.*
2. *Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.*
3. *Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility.*
4. *Explain the various components of robots and its feedback systems and its corrective measures*
5. *Apply kinematic and dynamic modeling using D-H notation and select appropriate hardware and control strategies for real-world industrial scenario to analyze and design automated and robotic systems.*
6. *Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks.*

UNIT – I

Introduction to Automation: Need, Types, Basic elements of an automated system, Manufacturing Industries, Types of production, Functions in manufacturing, Organization and information processing in manufacturing, Automation strategies and levels of automation, Hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT – II

Automated flow lines: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, Quantitative analysis of flow lines. Assembly line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT- III

Introduction to Industrial Robotics: Classification of Robot Configurations, functional line diagram, degrees of freedom. Components common types of arms, joints grippers, factors to be considered in the design of grippers.

Robot actuators and Feedback components: Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

UNIT- IV

Manipulator Kinematics: Homogenous transformations as applicable to rotation and transition - D-H notation, Forward inverse kinematics.

Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton – Euler formations. Trajectory Planning: Trajectory Planning and avoidance of obstacles path planning, skew motion, joint integrated motion - straight line motion.

UNIT- V

Robot Programming: Methods of programming - requirements and features of programming languages, software packages. Problems with programming languages

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading – Process spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS

1. M.P. Groover, *Automation, Production Systems and CIM*, Pearson Education, 2008
2. M.P. Groover *Industrial Robotics* , TMH, 1986

REFERENCES

1. Fu K S, *Robotics* McGraw Hill, 4th edition, 2010.
2. P. Coiffet and M. Chaironze, Kogam *An Introduction to Robot Technology*, Page Ltd. London. 1983
3. Ashitave Ghosal *Robotics, Fundamental Concepts and analysis*, Oxford Press, 1st edition, 2006
4. Mittal R K & Nagrath I J, *Robotics and Control*, TMH, 1999

ONLINE LEARNING RESOURCES

https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSYmnmhl-gt76o

https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4DwjfSODT3ZJgwEjyE

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(AUTONOMOUS)

III B.Tech – II Sem.

L	T	P	C
3	0	0	3

(23EC0441) DIGITAL ELECTRONICS
(Open Elective –II)

COURSE OBJECTIVES

The objectives of this course

1. *To learn Boolean algebra, logic simplification techniques, and combinational circuit design.*
2. *To analyse combinational circuits like adders, subtractors, and code converters.*
3. *To explore combinational logic circuits and their applications in digital design.*
4. *To understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.*
5. *To gain knowledge about programmable logic devices and digital IC's.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Apply Boolean algebra and Karnaugh Maps to simplify and analyse logic expressions.*
2. *Design basic logic gates like AND, OR, NAND, NOR, XOR..*
3. *Analyze and design combinational circuits like adders, subtractors, and perform code conversions.*
4. *Design and implement logic functions using multiplexers, decoders, encoders, and comparators.*
5. *Understand sequential logic circuits, including latches, flipflops, counters, and shift registers.*
6. *Implement logic circuits using ROM, PLA, PAL, and standard digital ICs like 74-series*

UNIT – I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT-II

Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT-III

Combinational Logic Design 2: Decoders, Encoders, Priority Encoder, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers

UNIT-IV

Sequential Logic Design: Latches, Flip-flops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, set up and hold times, Ripple counters, Shift registers.

UNIT-V

Programmable Logic Devices: ROM, Programmable Logic Devices (PLA and PAL).

Digital IC's: Decoder (74x138), Priority Encoder (74x148), multiplexer (74x151) and de-multiplexer (74x155), comparator (74x85).

TEXT BOOKS

1. M.Morris Mano & Michel D. Ciletti, *Digital Design*, Pearson Education, 5th edition, 1999.
2. ZviKohavi and NirahK.Jha, *Switching theory and Finite Automata Theory*, Tata McGraw Hill, 2nd edition, 2005.

REFERENCES

1. Charles H Roth, Jr. *Fundamentals of Logic Design*, Brooks/cole Cengage Learning, 5th edition, 2004.

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III B.Tech – II Sem.

L	T	P	C
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(23CS0511) OPERATING SYSTEMS
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course

1. *Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection*
2. *Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.*
3. *Illustrate different conditions for deadlock and their possible solutions.*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to

1. *Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication.*
2. *Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection.*
3. *Analyze the requirement for process synchronization and deadlocks handled by operating system.*
4. *Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.*
5. *Illustrate different conditions for deadlock and their possible solutions.*
6. *Analyze the memory management and its allocation policies.*

UNIT –I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT -II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT- III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT- IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing

Storage Management: Overview of Mass Storage Structure, HDD Scheduling.

UNIT- V

File System Interface: File concept, Access methods, Directory Structure;

File System Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File System Mounting, Partitions and Mounting, File Sharing.

Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

TEXT BOOKS

1. Silberschatz A, Galvin P B, Gagne G, *Operating System Concepts*, Wiley, 10th edition, 2018
2. Tanenbaum A S, *Modern Operating Systems*, Pearson, 4th edition, 2016

REFERENCES

1. Stallings W, *Operating Systems -Internals and Design Principles* , Pearson, 9th edition, 2018
2. D.M. Dhamdhere, *Operating Systems: A Concept Based Approach*, 3rd edition, 2013

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/106/106/106106144/
http://peterindia.net/OperatingSystems.html

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B.Tech-CE

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III B.Tech – II Sem.

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(23CS0556) INTRODUCTION TO MACHINE LEARNING
(Open Elective-II)

COURSE OBJECTIVES

The course is introduced for students

1. *To introduce the fundamental concepts and types of machine learning.*
2. *To develop a deep understanding of supervised and unsupervised learning algorithms.*
3. *To understand mathematical foundations of learning models and algorithms.*
4. *To evaluate model performance using appropriate statistical and analytical tools.*
5. *To apply machine learning techniques to solve real-world problems using tools such as Scikit- learn.*

COURSE OUTCOMES (COs)

After completion of the course, students will be able to

1. *Understand and distinguish among different types of learning methods.*
2. *Apply supervised and unsupervised learning algorithms to datasets.*
3. *Analyze model performance using cross-validation and error metrics.*
4. *Build, test, and improve machine learning models for classification and prediction.*
5. *Use Python-based libraries (e.g., Scikit-learn) to implement ML algorithms*
6. *Evaluate machine learning models using appropriate validation techniques*

UNIT – I

Introduction to Machine Learning: Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.

UNIT-II

Nearest Neighbour-Based Models: Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures ,K-Nearest Neighbour Classifier, Radius Distance Nearest Neighbour Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.

UNIT-III

Models Based on Decision Trees: Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression.

The Bayes Classifier: Introduction to the Bayes Classifier, Bayes‘ Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)

UNIT-IV

Linear Discriminants for Machine Learning: Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Back propagation for Training an MLP.

UNIT-V

Clustering : Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.

TEXT BOOKS

1. M N Murthy, V S Ananthanarayana, *Machine Learning Theory and Practice*, Universities Press (India), 2024

REFERENCES

1. Tom M. Mitchell, *Machine Learning* , McGraw-Hill Publication, 2017
2. Peter Harrington, *Machine Learning in Action*, Dream Tech
3. Pang-Ning Tan, Michel Stenbach, Vipin Kumar, *Introduction to Data Mining*, 7th edition, 2019.

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B.Tech-CE

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(AUTONOMOUS)

III B.Tech – II Sem.

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(23HS0853) OPTIMIZATION TECHNIQUES IN ENGINEERING
(Open Elective –II)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide the basic knowledge about Optimization, importance, application areas of in the industry, Linear Programming.*
2. *To impart different optimization models under typical situations in the business organization like transportation, assignment.*
3. *To understand the process of sequencing in a typical industry.*
4. *To describe different game strategies under cut-throat competitive business environment*

COURSE OUTCOMES (COs)

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

1. *Understand the meaning, purpose, tools of Operations Research and linear programming in solving practical problems in industry.*
2. *Interpret the transportation models' solutions and infer solutions to the real-world problems.*
3. *Develop mathematical skills to analyse and solve nonlinear programming models arising from a wide range of applications.*
4. *Understand theoretical concepts, formulating problems, applying various methods, and analysing their performance.*
5. *Apply the concept of non-linear programming for solving the problems involving non-linear constraints and objectives.*
6. *Apply the concept of unconstrained geometric programming for solving the problems involving non-linear constraints and objectives.*

UNIT – I

Linear Programming I: Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method, Big-M method.

UNIT - II

Linear Programming II: Duality in Linear Programming- Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem, Complementary slackness Theorem

UNIT - III

Non-linear Programming: Unconstrained Optimization Techniques - Introduction: Classification of Unconstrained minimization methods

Direct Search Methods: Random Search Methods: Descent Method and Fletcher Powell Method, Grid Search Method

UNIT - IV

Non-linear Programming: Constrained Optimization Techniques - Introduction, Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT - V

Geometric Programming

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems: Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

TEXT BOOKS

1. Singiresu S Rao., *Engineering Optimization: Theory and Practices*, New Age Int. (P) Ltd. Publishers, New Delhi
2. J. C. Panth, *Introduction to Optimization Techniques*, Jain Brothers, New Delhi, 7th edition

REFERENCES

1. Harvey M. Wagner, *Principles of Operation Research*, Prentice-Hall of India Pvt. Ltd. New Delhi.
2. Peressimi A.L., Sullivan F.E., Vhl, J. J. *Mathematics of Non-linear Programming*, Springer – Verlag.

ONLINE RESOURCES

https://onlinecourses.nptel.ac.in/noc24_ee122/preview
https://archive.nptel.ac.in/courses/111/105/111105039/
https://onlinecourses.nptel.ac.in/noc21_ce60/preview

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(23HS0858) MATHEMATICAL FOUNDATION OF QUANTUM TECHNOLOGIES
(Open Elective -II)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide students with essential linear algebra foundations including vector spaces, inner products, and operators for quantum mechanical applications.*
2. *To develop understanding of the transition from finite-dimensional systems to infinite-dimensional function spaces and Hilbert space concepts.*
3. *To establish quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution principles.*
4. *To enable students to apply quantum mechanical principles to solve problems in simple quantum systems and understand statistical interpretation.*
5. *To introduce advanced concepts in composite systems, measurement processes, and modern perspectives in quantum mechanics.*

COURSE OUTCOMES (COs)

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

1. *Apply linear algebra concepts to function spaces and analyse the transition from finite to infinite dimensional systems.*
2. *Understand vector spaces, inner products, and linear operators with applications to quantum systems.*
3. *Analyze quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution.*
4. *Apply quantum mechanical principles to solve problems in simple quantum systems and evaluate statistical interpretations.*
5. *Understand statistical applications and interpretation with measurement processes..*
6. *Evaluate advanced concepts in composite systems and synthesize understanding of measurement processes and modern quantum theory.*

UNIT - I

Linear Algebra Foundation for Quantum Mechanics: Vector spaces definition and examples (R^2, R^3, function spaces), Inner products (dot product, orthogonality, normalization), Linear operators (matrices, eigenvalues, eigenvectors), Finite-dimensional examples (2×2 matrices, spin-1/2 systems), Dirac notation introduction ($|\psi\rangle$, $\langle \varphi|$, $\langle \varphi|\psi\rangle$), Change of basis (transformations, unitary matrices).

UNIT - II

From Finite to Infinite Dimensions: Function spaces (L^2 space, square-integrable functions), Inner products for functions ($\int \psi^* \varphi \, dx$), Orthogonal function sets (Fourier series, basis functions), Introduction to Hilbert space concept (complete inner product spaces), Position and momentum representations (wave functions), Operators on functions (d/dx, multiplication by x)..

UNIT - III

Quantum Mechanical Formalism: Mathematical formulation (states as vectors, observables as operators), Measurement theory (Born rule, expectation values, probabilities), Uncertainty relations (mathematical derivation from commutators), Time evolution (Schrödinger equation, unitary evolution).

UNIT - IV

Applications and Statistical Interpretation: Simple applications (infinite square well, harmonic oscillator), Statistical interpretation (ensembles, pure vs mixed states), Measurement process (von Neumann measurement scheme).

UNIT V

Advanced Topics: Composite systems (tensor products basic introduction), Reversibility and irreversibility (unitary evolution vs measurement), Thermodynamic connections (equilibrium states, entropy), Modern perspectives (decoherence, measurement problem conceptual).

TEXT BOOKS

1. David J. Griffiths, Darrell F. Schroeter, *Introduction to Quantum Mechanics*, Cambridge University Press, 3rd edition, 2018.
2. R. Shankar, *Principles of Quantum Mechanics*, Kluwer Academy/Plenum Publishers, 2nd edition, 1994.

REFERENCES

1. George. F. Simmons, *Introduction to Topology and Modern Analysis*, Med Tech Science Press.
2. Gilbert Strang, *Linear Algebra and Its Applications*, Cengage Learning, 4th edition, 2006
3. Johnvon Neumann and Robert T Beyer, *Mathematical Foundations of Quantum Mechanics*, Princeton Univ. Press, 1996

WEB RESOURCES

1. https://eclass.uoa.gr/modules/document/file.php/CHEM248/Griffiths%20-%20Introduction%20to%20Quantum%20Mechanics%203rd%20ed%202018.pdf
2. https://fisica.net/mecanica-quantica/Shankar%20-%20Principles%20of%20quantum%20mechanics.pdf

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B.Tech-CE

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(23HS0843) PHYSICS OF ELECTRONIC MATERIALS AND DEVICES
(Open Elective-II)

COURSE OBJECTIVES

The objectives of the course are

1. *To make the students to understand the concept of crystal growth, defects in crystals and thin films*
2. *To provide insight into various semiconducting materials and their properties.*
3. *To develop a strong foundation in semiconductor physics and device engineering.*
4. *To elucidate excitonic and luminescent processes in solid-state materials.*
5. *To understand the principles, technologies, and applications of modern display systems.*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Understand crystal growth and thin film preparation*
2. *Summarize the basic concepts of semiconductors*
3. *Illustrate the working of various semiconductor devices*
4. *Explain the different types of Transistors.*
5. *Analyze various luminescent phenomena and the devices based on these concepts*
6. *Explain the working of different display devices*

UNIT – I

Fundamentals of Materials Science: Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. The basic idea of point, line, and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge)

UNIT – II

Semiconductors: Introduction, charge carriers in semiconductors, Change of electron-hole concentration- Qualitative analysis, The Fermi level & Fermi-Dirac distribution Function, Effects of temperature on Fermi-Dirac distribution Function Temperature dependency of carrier concentration, Conductivity and mobility, High field effects. Diffusion and drift, generation and recombination, Diffusion length, effective mass, Electron and Hole in quantum well

UNIT — III

Physics of Semiconductor Devices: Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Heterojunctions, Transistors, BJT.

UNIT - IV

Excitons and Luminescence:

Luminescence: Different types of luminescence, basic definitions, Light emission in solids, Inter- band luminescence, Direct and indirect gap materials.

Photoluminescence: General Principles of photoluminescence, Excitation and relaxation, OLED, Quantum-dot.

Electro-luminescence: General Principles of electroluminescence, light emitting diode, diode laser.

UNIT - V

Display Devices: LCD, three-dimensional display: Holographic display, light- field displays: Head-mounted display, MOEMS (Micro-Opto-Electro-Mechanical Systems).

TEXT BOOKS

1. S.O. Kasap, *Principles of Electronic Materials and Devices*, McGraw Hill Education (India) Pvt. Ltd., 4th edition, 2021.
2. *Semiconductor Physics & Devices: Basic Principles*, McGraw Hill, 4th edition, 2012.

REFERENCES

1. B.G. Streetman and S. Banerjee, *Solid State Electronic Devices*, PHI Learning, 6th edition
2. Eugene A. Irene, *Electronic Materials Science*, Wiley, 2005
3. Grover and Jamwal, *Electronic Components and Materials*, Dhanpat Rai and Co., New Delhi, 2012.
4. Wei Gao, Zhengwei Li, Nigel Sammes, *An Introduction to Electronic Materials for Engineers*, World Scientific Publishing Co. Pvt. Ltd. 2nd edition, 2011

ONLINE RESOURCES

https://nptel.ac.in/courses/113/106/113106062/

https://onlinecourses.nptel.ac.in/noc20_ph24/preview

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B.Tech-CE

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(23HS0807) CHEMISTRY OF POLYMERS AND APPLICATIONS
(Open Elective-II)

COURSE OBJECTIVES

The objectives of this course

1. *To understand the basic principles of polymers.*
2. *To understand natural polymers and their applications.*
3. *To impart knowledge to the students about synthetic polymers, their preparation and importance.*
4. *To enumerate the applications of hydrogel polymers.*
5. *To enumerate applications of conducting and degradable polymers in engineering.*

COURSE OUTCOMES (COs)

After completion of the course, students will be able to

1. *Understand fundamentals of polymers and moulding of plastics. [L2]*
2. *Analyze the chemical and physical properties of natural polymers and their applications. [L4]*
3. *Apply the knowledge of thermoplastic and thermoset polymers in practical situations. [L3]*
4. *Evaluate the environmental and industrial relevance of synthetic polymers and their applications.*
5. *Understand the fundamental principles of hydrogel in polymer networks. [L2]*
6. *Analyze the preparation and mechanism of conducting and degradable polymers. [L4]*

UNIT – I

Polymers Basics and Characterization: Basic concepts of Polymers, Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT – II

Natural Polymers & Modified Cellulosics:

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified Cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

UNIT – III

Synthetic Polymers: Addition and condensation polymerization processes– Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties. Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers (PE, PVC),Poly Carbonates, Urea-formaldehyde, phenol – formaldehyde, Melamine-Formaldehyde, Epoxy and Ion exchange resins.

UNIT-IV

Hydrogels of Polymer Networks: Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Applications of hydrogels in drug delivery.

UNIT – V

Conducting and Degradable Polymers:

Conducting Polymers: Introduction, Classification, Mechanism of conduction in Poly Acetylene, Poly Aniline, Poly Thiophene, Doping, Applications

Degradable Polymers: Introduction, Classifications, Examples, Mechanism of degradation, poly lactic acid, Nylon-6, Polyesters, applications.

TEXT BOOKS

1. Billmayer, *A Text book of Polymer Science*
2. G.S.Mishra, *Polymer Chemistry*
3. Gowarikar, *Polymer Chemistry*

REFERENCES

1. K.J.Saunders, *Organic Polymer Chemistry,* Chapman and Hall.
2. B.Miller, *Advanced Organic Chemistry,* Prentice Hall.
3. Premamoy Ghosh, *Polymer Science and Technology,* McGraw Hill, 3rd edition, 2010.

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(23HS0823) ACADEMIC WRITING AND PUBLIC SPEAKING
(Open Elective-II)

COURSE OBJECTIVES

The objectives of the course are

1. *To encourage all round development of the students by focusing on writing skills*
2. *To make the students aware of non-verbal skills*
3. *To develop analytical skills*
4. *To deliver effective public speeches*

COURSE OUTCOMES (COs)

By the end of the program students will be able to

1. *Understand various elements of Academic Writing(L1,L2)*
2. *Identify sources and avoid plagiarism(L1,L2)*
3. *Demonstrate the knowledge in writing a Research paper(L3)*
4. *Analyze different types of essays(L4)*
5. *Assess the speeches of others and know the positive strengths of speakers(L5)*
6. *Build confidence in giving an impactful presentation to the audience(L3)*

UNIT – I

Introduction to Academic Writing: Introduction to Academic Writing- Essential Features of Academic Writing- Courtesy- Clarity – Conciseness- Correctness - Coherence - Completeness- Types- Descriptive, Analytical, Persuasive, Critical Writing.

UNIT - II

Academic Journal Article: Art of Condensation- Summarizing and Paraphrasing- Abstract Writing, Writing Project Proposal, Writing Application for Internship, Technical/Research/ Journal Paper Writing- Conference Paper Writing- Editing, Proof Reading- Plagiarism

UNIT - III

Essay &Writing Reviews: Compare and Contrast- Argumentative Essay- Exploratory Essay- Features and Analysis of Sample Essays- Writing Book Report, Summarizing, Book/Film Review- SoP

UNIT - IV

Public Speaking: Introduction, Nature, Characteristics, Significance of Public Speaking- Presentation- 4 Ps of Presentation- Stage Dynamics- Answering Strategies- Analysis of Impactful Speeches- Speeches for Academic Events.

UNIT - V

Public Speaking and Non-Verbal Delivery: Body Language–Facial Expressions-Kinesics–Oculesics–Proxemics– Haptics – Chronomics- Paralanguage-Signs.

TEXT BOOKS

1. *Critical Thinking, Academic Writing and Presentation Skills*, MG University Edition Paperback – 1, Pearson Education; First edition, January 2010
2. Pease, Allan & Barbara, *The Definitive Book of Body Language*, RHUS Publishers, 2016

REFERENCES

1. Alice Savage, Masoud Shafiei, *Effective Academic Writing*, Oxford University Press, 2nd edition, 2014
2. ShaliniVerma, *Body Language*, S Chand Publications 2011.
3. Sanjay Kumar and Pushpalata, *Communication Skills*, Oxford, 2nd edition, 2015
4. Sharon Gerson, Steven Gerson, *Technical Communication Process and Product*, Pearson, New Delhi, 2014
5. Elbow, Peter, *Writing with Power*, OUPUSA, 1998

ONLINE LEARNING RESOURCES

https://youtu.be/NNhTIT81nH8
https://www.youtube.com/watch?v=478ccrWKY-A
https://www.youtube.com/watch?v=nzGo5ZC1gMw
https://www.youtube.com/watch?v=Qve0ZBmJMh4
https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-nonverbal-aspects-of-delivery/
https://onlinecourses.nptel.ac.in/noc21_hs76/preview
https://archive.nptel.ac.in/courses/109/107/109107172/#
https://archive.nptel.ac.in/courses/109/104/109104107/

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IV B.Tech – I Sem.

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(23CE0137) FINITE ELEMENT METHODS

COURSE OBJECTIVES

The objectives of this course is 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 for1D, 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. *Apply the Finite Element Method (FEM) to solve elasticity problems by formulating & solving stress-strain equation in plane stress & plane strain condition.*
2. *Apply Lagrangian and Serendipity finite element formulations using Hermite polynomials and shape functions to model regular & irregular 2D and 3D elements.*
3. *Develop stiffness matrix and shape functions for beam elements.*
4. *Analyze continuous beams and plane stress/strain problems using FEM.*
5. *Analyze 2D elements using CST and LST by formulating shape functions.*
6. *Apply numerical integration, static condensation, and global stiffness matrix assembly techniques to solve finite element problems under static loading conditions*

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 2D &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. Iso-parametric formulation - Concepts of Iso-parametric 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. S.S. Bhavakatti, *Finite Element Analysis*, New Age International Publishers, 2021
2. T R Chandrupatla and AD, *Introduction to Finite Element in Engineering*, Cambridge University Press, 5th edition. 2021

REFERENCES

1. Dr.S.Senthil and R. Panneerdhass, *Finite Element Analysis*, Lakshmi Publications, Chennai, 2016
2. H.V. Lakshminaryana, *Finite Element Analysis and Procedures in Engineering*, Universities Press, Hyderabad, 3rd edition, 2004
3. Robert D. Cook, Malkus and Michael E. Plesha. *Concepts and Applications of Finite Element Analysis*, John Wiley & Sons, 2001
4. Krishnamurthy, *Finite Element Analysis (Theory and Programming)*, Tata McGraw Hill Co. Ltd. New Delhi, 2017
5. David V Hutton, *Finite Element Analysis*, Tata McGraw Hill, New Delhi, 2017

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B.Tech-CE

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IV B.Tech – I Sem.

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(23HS0861) BUSINESS ETHICS AND CORPORATE GOVERNANCE
(Management Course-II)

COURSE OBJECTIVES

The objectives of this course:

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.*

COURSE OUTCOMES (COs)

After the completion of course Students will be able to:

1. *Apply various ethical principles in business and corporate social responsibility practices*
2. *Recognize how personal ethics can influence behavior and apply in decision making*
3. *Explain the ethical challenges facing the various functional departments*
4. *Identify the organizational and cultural variables that impact ethical judgment*
5. *Analyze various ethical codes in corporate governance*
6. *Identify organizational policies and systems that employ ethical conduct*

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.

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.

UNIT-III

Ethical Aspects in Organization II: Ethics in Finance: Insider Trading – Ethical Investment - Combating Frauds. Ethical Issues in Information Technology: Information Security and Threats – Intellectual Property Rights – Cyber Crime.

UNIT- IV

Legal Frame Work: Law and Ethics -Agencies Enforcing Ethical Business Behaviour - 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.

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

TEXT BOOKS

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

REFERENCES

1. Dr. K. Nirmala, Karunakara Reddy. *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.*

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(23HS0862) E-BUSINESS
(Management Course-II)

COURSE OBJECTIVES

The objectives of this course

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 make the students aware of different e-marketing channels & strategies.

COURSE OUTCOMES (COS)

After the completion of course Students will be able to:

1. Remember E-Business & its nature, scope and functions.
2. Understand E-market-Models which are practicing by the organizations.
3. Apply the concepts of E-Commerce in the present globalized world.
4. Analyze the various E-payment systems & importance of net banking.
5. Evaluate market research strategies & E-advertisements.
6. Understand importance of E-security & control.

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.

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.

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.

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.

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)

TEXT BOOKS

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

REFERENCES

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

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(23HS0863) MANAGEMENT SCIENCE
(Management Course-II)

COURSE OBJECTIVES

The objectives of this course:

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.*

COURSE OUTCOMES (COs)

After the completion of course Students will be able to:

1. *Remember the concepts & principles of management and designs of organization in a practical world.*
2. *Understand the knowledge of Work-study principles & Quality Control techniques in industry.*
3. *Apply the process of Recruitment & Selection in organization.*
4. *Analyze the concepts of HRM & different training methods.*
5. *Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyse the business through SWOT.*
6. *Create awareness on contemporary issues in modern management & technology.*

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.

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.

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.

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).

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.

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*, TMH, 6th edition, 2005.
3. Thomas N.Duening & John M.Ivancevich, *Management Principles and Guidelines,* Biztantra.
4. Kanishka Bedi, *Production and Operations Management,* Oxford University Press, 2004.
5. Samuel C.Certo, *Modern Management*, PHI, 9th edition, 2005.

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(23CE0138) GEO-SYNTHETICS AND REINFORCED EARTH STRUCTURES
(Professional Elective – IV)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the concept and applications of reinforced earth, including friction coefficient*
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 analyse reinforced pavements using standard design approaches.*

COURSE OUTCOMES (COs)

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

1. *Understand the principles of reinforced earth assess the effects of reinforcement on soil properties and apply the concept in design and construction practices.*
2. *Evaluate the geosynthetics properties through testing, and identify their applications in geotechnical engineering.*
3. *Analyze stability mechanisms involved in the design of reinforced earth retaining walls.*
4. *Design reinforcement layouts for reinforced earth retaining walls based on stability requirements.*
5. *Evaluate reinforced embankments and foundation mattresses with respect to settlement and load-bearing capacity.*
6. *Design and analyse reinforced pavements and soil beds using standard methodologies.*

UNIT – I

Reinforced Earth: Concept, Effects of Reinforcement on Soils - Equal Confining and Psuedo 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. G L Sivakumar Babu, *An Introduction to Soil Reinforced and Geosynthetics,* Universities Press (India) Pvt. Ltd., 2005.
2. Sanjay Kumar Shukla and Jian-Hua Yin, *Fundamentals of Geosynthetics Engineering*, CRC Press, 1st edition, 2006.
3. Swami Saran, I.K., *Reinforced Soil and its Engineering Applications*, International Publishing House Pvt. Ltd., 1st edition, 2019.

REFERENCES

1. Robert M Koerner, R.M, *Designing with Geosynthetics*. Pearson Education Inc., 6th edition, 2012.
2. G. Venkatapparao, *Advances in Geosynthetics*, Sai Master Geoenvironmental Services Pvt. Ltd. Publications.
3. Koerner, R.M., *Designing with Geosynthetics*, Pearson Education Inc., 6th edition, 2012.
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

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(23CE0139) RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING
(Professional Elective-IV)

COURSE OBJECTIVES

The objectives of this course is to

1. Understand the components and geometric design principles of railway tracks.
2. Analyze the principles of railway track design, signalling, 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, harbours, docks, and navigation aids.

COURSE OUTCOMES (COs)

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

1. Inspect the various components of permanent way for the assembly and alignment.
2. Design various geometric features of a railway track.
3. Conduct various surveys and can select the proper site required for an airport.
4. Plan for a simple airport building with the necessary components.
5. Design various geometric features of a runway and taxiway.
6. Inspect and maintain various components of port and harbours.

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 - Signalling 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 Harbours: Harbours - Requirements of Ports and Harbours - Types of Ports - Classification of Harbours - Docks and Types of Docks - Dry Docks, Wharves and Jetties - Breakwaters: Layouts of Different Types of Harbours and Docks - Dredging Operations - Navigation Aids

TEXT BOOKS

1. S.C.Saxena and S.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai and Sons, New Delhi, 2010
2. K.P. Subramanian, *Highway, railway, Airport and Harbour Engineering*, Scitech Publishers

REFRENCES

1. R. Srinivasan, *Harbour, Dock and Tunnel Engineering*, Charotar Publishing House Pvt. Limited
2. J.S.Mundrey, *Railway Track Engineering*, McGraw Hill Education, 5th edition, 2017
3. S.P.Chandola, *A Text book of Transportation Engineering*, S.Chand & Co. Ltd., 2001

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/105107123

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(23CE0140) EXPERIMENTAL STRESS ANALYSIS
(Professional Elective – IV)

COURSE OBJECTIVES

The objectives of this course is 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 photo elasticity and its applications.*
5. *Apply two-dimensional photo elasticity methods for stress analysis in materials.*

COURSE OUTCOMES (COs)

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

1. *Apply experimental methods to simplify and solve basic stress problems by different methods.*
2. *Identify and evaluate suitable strain gauge materials and adhesive bases for various experimental setups.*
3. *Apply the knowledge of strain rosettes to analyse different types of rosettes for transverse strain gauge.*
4. *Apply Ultrasonic Pulse Velocity (UPV) and Hammer tests to assess quality of concrete.*
5. *Analyze the behaviour of stressed photo elastic model using polariscope.*
6. *Analyze principles of photo elasticity and the behaviour of light in stressed transparent materials.*

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 Rosettes 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 Photo Elasticity: Introduction -Temporary double refraction - The stress optic law - Effects of stressed model in a polar scope for various arrangements - Fringe sharpening. Brewster's stress optic law

UNIT – V

Two Dimensional Photo Elasticity: Introduction - Isochramic 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 Photo elastic materials.

TEXT BOOKS

1. J.W.Dally and W.F.Riley, *Experimental Stress Analysis*, College House Enterprises, 2005
2. Dr.Sadhu Singh, *Experimental Stress Analysis*, *K*hanna Publishers, 4th edition, 2015

REFERENCES

1. U.C.Jindal, *Experimental Stress Analysis*, Pearson Publications, 2012
2. L.S.Srinath, *Experimental Stress Analysis*, McGraw Hill Company Publishers
3. James F. Doyle, *Modern Experimental Stress Analysis*, John Wiley & Sons, Ltd

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(23CE0141) GROUND IMPROVEMENT TECHNIQUES
(Professional Elective-V)

COURSE OBJECTIVES

The objectives of this course is 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 geo synthetics in soil improvement and slope stability.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Determine swell pressure and recommend suitable foundation system for expansive soils.*
2. *Implement various dewatering techniques to control settlement prior to construction and apply grouting techniques.*
3. *Implement densification methods to strengthen granular soils.*
4. *Implement densification methods to strengthen cohesive soils*
5. *Implement various stabilization techniques to improve shear strength soils..*
6. *Design reinforced earth structures and use geosynthetics for improving quality & earth and earth structures*

UNIT – I

Expansive Soils: 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

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

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 Granular Soils: In-Situ Densification Methods in Granular Soils - Vibration at the Ground Surface, Impact at the Ground Surface, Vibration at Depth, Impact at Depth.

Densification Methods in Cohesive Soils: 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

Stabilization: Methods of Stabilization – Mechanical – Cement - Lime - Bituminous Chemical Stabilization With Calcium Chloride, Sodium Silicate and Gypsum

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

REFERENCES

1. Moseley M.P., *Ground Improvement*, Blackie Academic and Professional, Boca Taton, Florida, USA, 1993
2. Nihar Ranajan Patra, *Ground Improvement Techniques*, Vikas Publications, New Delhi
3. Xanthakos P.P, Abramson, L.W and Brucwe, D.A, *Ground Control and Improvement*, John Wiley and Sons, New York, USA, 1994
4. P. C. Varghese, *Foundation Engineering*, Prentice Hall of India
5. R. M. Koerner, *Designing with Geosynthetics*, Prentice Hall Publication, New Jersey

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(23CE0142) SUBSURFACE INVESTIGATION AND INSTRUMENTATION
(Professional Elective – V)

COURSE OBJECTIVES

The objectives of this course is 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)

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

1. *Classify the various transported and residual soils.*
2. *Extract the disturbed and undisturbed samples for geotechnical investigation/ subsoil exploration.*
3. *Evaluate borehole logging, groundwater observations.*
4. *Groundwater observations, preparation of soil profile and report.*
5. *Understand and perform field and geophysical soil tests, and use the results for geotechnical analysis and design.*
6. *Prepare soil exploration report.*

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 Sampler‘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. Clayton C. R., Matthews M. C and Simons N. E., *Site Investigation,* Blackwell Science, 2005.
2. John Dunn Cliff, *Geotechnical Instrumentation for Monitoring Field Performance*, Wiley-Interscience, 2008.

REFERENCES

1. A.S. Rao and Gopal Ranjan, *Basic and Applied Soil Mechanics*, New Age International, 3rd edition, 2016.
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://onlinecourses.nptel.ac.in/noc25_ce27/preview
https://onlinecourses.nptel.ac.in/noc22_ce81/preview

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(23CE0143) TRANSPORTATION ECONOMICS
(Professional Elective – V)

COURSE OBJECTIVES

The objectives of this course is 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 this course, students will be able to

1. Evaluate transportation projects by integrating development processes, financial feasibility, impact modelling and ethical making decision.
2. Evaluate various costs associate with transportation and estimate transportation demand and supply.
3. Determine vehicle operating costs.
4. Evaluate accident cost impacts and suggest engineering or policy measures to minimize it.
5. Apply economic evaluation methods to assess the feasibility of transportation projects.
6. Study the viability of various road project model and perform risk and value for money analysis.

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 Behaviour 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. Sarkar P. K., and Maitri V., *Theory and Applications of Economics in Highway and Transport Planning*, Standard Publisher, New Delhi, 2nd edition, 2017
2. Winfrey, *Economic Analysis for Highways*, International Textbook Company, Pennsylvania, 1969.

REFERENCES

1. IRC, *Manual on Economic Evaluation of Highway Projects in India*, SP30, 3rd revision, 2019
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 Publishing, 2004
4. Button K. J., *Transport Economics*, Edward Elgar Publishing, 4th edition, 2022

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

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(23CE0144) SKILLS IN CIVIL ENGINEERING SOFTWARE (STAADPRO/CAD/TEKLA)

COURSE OBJECTIVES

The objectives of this course is to

1. Provide fundamental knowledge of AutoCAD and Tekla for 2D drafting and 3D modelling.
2. Train students in structural analysis and design using STAAD.Pro
3. Develop skills in reinforcement detailing and structural component modelling.
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. Develop floor plan for residential building using AUTO CAD
2. Develop the reinforcement detailing for slabs, columns, beams and footings using AutoCAD
3. Analyze steel column, roof trusses and composite beams using TEKLA
4. Analyze a simply supported beam using STAAD.Pro
5. Perform structural analysis of multi-story building using STAAD.Pro.
6. Analyze structures for seismic load conditions in STAAD.Pro.

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
2. *TEKLA Structural Designer 2023 Engineers*, Hand Book by Trimble Solutions Corporation

REFERENCES

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

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(23HS0820) GENDER SENSITIZATION
(Audit Course)

COURSE OBJECTIVES

The objectives of this course

1. *To enable students to understand gender related issues, vulnerability of women and men.*
2. *To familiarize them about constitutional safeguard for gender equality.*
3. *To expose the students to debates on the politics and economics of work.*
4. *To help students reflect critically on gender violence.*
5. *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 (COs)

By the end of the program students will be able to

1. *Understand the basic concepts of gender and its related terminology [L1,L2]*
2. *Identify the biological, sociological, psychological and legal aspects of gender.[L1,L2]*
3. *Use the knowledge in understanding how gender discrimination works in our society and how to counter it. [L3]*
4. *Analyze the gendered division of labor and its relation to politics and economics.[L4]*
5. *Appraise how gender-role beliefs and sharing behavior are associated with more well-being in all culture and gender groups.[L5]*
6. *Develop students' sensibility with regard to issues of gender in contemporary India.[L3]*

UNIT-I

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-II

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 - III

Gender and Labour: Division and Valuation of Labour- House Work: The Invisible Labour- 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- IV

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 –V

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

TEXT BOOKS

1. 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 Paper back Edn. March, 1990

REFERENCES

1. Wtatt, Robin and Massood, Nazia, *Broken Mirrors: The dowry Problems in India,* Sage Publications, London, 2011.
2. Datt, R. and Kornberg, J. (eds), *Women in Developing Countries, Assessing Strategies for Empowerment*, London: Lynne Rienner Publishers, 2002.
3. Brush, LisaD. *Gender and Governance,* Rawat Publication, New Delhi, 2007
4. Singh, Direeti, Women and Politics World Wide, NewDelhi, 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://kdpelmjpfafjppnhbloffcjpeomlnpah
https://www.arvindguptatoys.com/arvindgupta/k amla-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.―I Fought For My Life…and Won.‖ Available online (at:http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/)

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(23EE0263) SMART GRID TECHNOLOGIES
(Open Elective – III)

COURSE OBJECTIVES

The objectives of this course are to make the student to:

1. *To understand concept of smart grid and its advantages over conventional grid*
2. *To know smart metering techniques*
3. *To learn wide area measurement techniques*
4. *To understand the problems associated with integration of distributed generation & its solution through smart grid.*

COURSE OUTCOMES (COs)

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

1. *Understanding the Concept and Evolution of Smart Grids.*
2. *Analysing Wide Area Monitoring System.*
3. *Analysing of Synchrophasor Technology.*
4. *Applying Smart Metering and Advanced Metering Infrastructure (AMI) Concepts.*
5. *Evaluating Information and Communication Technology (ICT) Systems in Smart Grids.*
6. *Designing Smart Grid Applications and Cyber security Measures*

UNIT – I

Introduction to Smart Grid : Evolution of Electric Grid – Need for Smart Grid – Difference between conventional & smart grid – Overview of enabling technologies – International experience in Smart Grid deployment efforts – Smart Grid road map for India – Smart Grid Architecture.

UNIT – II

Wide Area Monitoring System : Fundamentals of Synchro phasor Technology – concept and benefits of Wide Area Monitoring System – Structure and functions of Phasor Measuring Unit (PMU) and Phasor Data Concentrator (PDC) – Road Map for Synchrophasor applications (NAPSI) – Operational experience and Blackout analysis using PMU - Case study on PMU.

UNIT – III

Smart Meters: Features and functions of Smart Meters – Functional specification – category of Smart Meters – Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) drivers and benefits – AMI protocol – Demand Side Integration: Peak load, Outage and Power Quality Management.

UNIT – IV

Information and Communication Technology: Overview of Smart Grid Communication system – Modulation and Demodulation Techniques: Radio Communication – Mobile Communication – Power Line Communication – Optical Fibre Communication – Communication Protocol for Smart Grid.

UNIT – V

Smart Grid Applications and Cyber Security: Applications : Overview and concept of Renewable Integration – Introduction to distributed generation - Role of Protective Relaying in Smart Grid – House Area Network – Advanced Energy Storage Technology: Flow battery – Fuel cell – SMES – Super capacitors – Plug – in Hybrid electric Vehicles - Cyber Security: Security issues in DG, Distribution Automation, AMI, Electric Vehicle Management Systems – Approach to assessment of smart grid cyber security risks – Methodologies. Cyber Security requirements – Smart Grid Information Model

TEXT BOOKS

1. James Momoh, *SMART GRID: Fundamentals of Design and Analysis*, John Wiley and Sons, New York, 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, *Smart Grid: Technology and Applications*, John Wiley & Sons, New Jersey, 2012.

REFERENCES

1. Power Grid Corporation of India Limited, *Smart Grid Primer*, Power Grid Corporation of India Limited, Bangalore, India, 1st edition, 2013.
2. Fereidoon.P.Sioshansi, *Smart Grid – Integrating Renewable, Distributed and Efficient Energy*, 1st edition, Academic Press, USA, 2011.
3. Stuart Borlase, *Smart Grids: Infrastructure, Technology and Solutions*, CRC Press Publication, England, 1st edition, 2013.
4. Phadke A G, Thorp J S, *Synchronized Phasor Measurements and their Applications*, Springer, New York, 1st edition, 2012.

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(23ME0357) 3D PRINTING TECHNOLOGIES
(Open Elective - III)

COURSE OBJECTIVES

The objectives of this course are to make the student to:

1. *Familiarize techniques for processing of CAD models for rapid prototyping.*
2. *Explain fundamentals of rapid prototyping techniques.*
3. *Demonstrate appropriate tooling for rapid prototyping process.*
4. *Focus Rapid prototyping techniques for reverse engineering.*
5. *Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.*
6. *Understand the software used STL file handling, post-processing steps, and real-world application challenges in 3D printing systems*

COURSE OUTCOMES (COs)

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

1. *Use techniques for processing of CAD models for rapid prototyping.*
2. *Understand and apply fundamentals of rapid prototyping techniques.*
3. *Use appropriate tooling for rapid prototyping process.*
4. *Use rapid prototyping techniques for reverse engineering.*
5. *Identify Various Pre – Processing, Processing and Post Processing errors in RP processes.*
6. *Demonstrate STL file issues and evaluate the importance of various 3D printing software tools*

UNIT – I

Introduction to 3D Printing: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

UNIT – II

Solid and Liquid Based RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Fusion Deposition Modelling (FDM), Laminated Object Manufacturing (LOM), Stereo lithography (SLA), Direct Light Projection System (DLP) and Solid Ground Curing (SGC).

UNIT – III

Powder Based & Other RP Systems:

Powder Based RP Systems: Working Principle, Materials, Advantages, Limitations and

Applications of Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Laser Engineered Net Shaping (LENS) and Electron Beam Melting (EBM).

Other RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Three Dimensional Printing (3DP), Ballastic Particle Manufacturing (BPM) and Shape Deposition Manufacturing (SDM).

UNIT – IV

Rapid Tooling & Reverse Engineering:

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development

UNIT – V

Errors in 3D Printing and Applications: Pre-processing, processing and post-processing errors, Part building errors in SLA, SLS, etc. Software: Need for software, MIMICS, Magics, Surgi Guide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, Solid View, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP. Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

TEXT BOOKS

1. Chee Kai Chua and Kah Fai Leong., *3D Printing and Additive Manufacturing Principles and Applications*, World Scientific Publications, 5th edition 2017.
2. Ian Gibson, David W Rosen, Brent Stucker., *Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing*, Springer, 2nd edition, 2010.

REFERENCES

1. Frank W.Liou., *Rapid Prototyping & Engineering Applications*, CRC Press, Taylor & Francis Group, 2011.
2. Rafiq Noorani., *Rapid Prototyping: Principles and Applications in Manufacturing*, John Wiley & Sons, 2006.

ONLINE LEARNING RESOURCES

NPTEL Course on Rapid Manufacturing

https://nptel.ac.in/courses/112/104/112104265/

https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/

https://slideplayer.com/slide/6927137/

https://www.mdpi.com/2073-4360/12/6/1334
https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
https://lecturenotes.in/subject/197
https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdfcompressed.pdf

1. https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
2. https://www.youtube.com/watch?v=NkC8TNts4B4.

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(23EC0414) MICROPROCESSORS AND MICROCONTROLLERS
(Open Elective - III)

COURSE OBJECTIVES

The objectives of this course

1. *To comprehend the architecture, operation, and configurations of the 8086 microprocessors.*
2. *To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.*
3. *To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.*
4. *To learn the architecture, instruction set, and programming of the 8051 microcontrollers.*
5. *To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.*

COURSE OUTCOMES (COs):

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

1. *Recall and identify fundamental concepts of microprocessor architectures.*
2. *Recall and identify fundamental concepts of microcontroller architectures*
3. *Demonstrate programming skills in assembly language for processors and controllers.*
4. *Analyze various interfacing techniques.*
5. *Analyze various microprocessors and microcontrollers.*
6. *Apply interfacing techniques to implement microprocessor/microcontroller-based systems.*

UNIT-I

8086 Architecture: Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT-II

8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT-III

8086 Interfacing: Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259

programmable interrupt controllers.

UNIT-IV

Microcontroller - Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT-V

Interfacing Microcontroller - Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TEXT BOOKS

1. Douglas V Hall, SSSP Rao, *Microprocessors and Interfacing – Programming and Hardware,* Tata McGraw Hill Education Private Limited, 3rd edition, 1994.
2. K M Bhurchandi, A K Ray, *Advanced Microprocessors and Peripherals,* McGraw Hill Education, 3rd edition, 2017.
3. Raj Kamal, *Microcontrollers: Architecture, Programming, Interfacing and System Design,* Pearson, 2nd edition, 2012.

REFERENCES

1. Ramesh S Gaonkar, *Microprocessor Architecture Programming and Applications with the 8085*, Penram International Publishing, 6th edition, 2013.
2. Kenneth J. Ayala, *The 8051 Microcontroller*, Cengage Learning, 3rd edition, 2004.

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(20CS0512) DATABASE MANAGEMENT SYSTEMS
(Open Elective - III)

COURSE OBJECTIVES

The objectives of this course

1. *Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra*
2. *Introduce the concepts of basic SQL as a universal Database language*
3. *Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization*
4. *Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to

1. *Understand the basic concepts of database management systems*
2. *Analyze a given database application scenario to use ER model for conceptual design of the database*
3. *Develop relational algebra expressions to query and optimize the database using SQL*
4. *Utilize SQL proficiently to address diverse query challenges*
5. *Employ normalization methods to enhance database structure*
6. *Assess and implement transaction processing, concurrency control and database recovery protocols in databases*

UNIT- I

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT- II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.

BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT- III

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical, operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations

UNIT- IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT- V

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing.

TEXT BOOKS

1. Raghurama Krishnan, Johannes Gehrke, *Database Management Systems,* TMH (For Chapters 2, 3, 4), 3rd edition
2. Silberschatz, Korth, Sudarsan, *Database System Concepts*, TMH (For Chapter 1 and Chapter 5), 5th edition

REFERENCES

1. Robert Kruse, *Data Structures and Program Design in C,* Pearson Education Asia
2. Trembley & Sorenson, *An introduction to Data Structures with applications,* McGraw Hill
3. Donald E Knuth, Addison-Wesley, *The Art of Computer Programming*, *Vol.1: Fundamental Algorithms,* 1997.
4. Langsam, Augenstein & Tanenbaum, *Data Structures using C & C++*, Pearson, 1995
5. N.Wirth, *Algorithms + Data Structures & Programs,* PHI
6. Horowitz Sahni & Mehta, *Fundamentals of Data Structures in C++*, Galgottia Publication
7. Thomas Standish, *Data structures in Java*, Pearson Education Asia
8. C J Date, *Introduction to Database Systems,* Pearson, 8th edition
9. RamezElmasri, Shamkant B. Navathe, *Database Management System,* Pearson,6th edition

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(23CS0536) CYBER SECURITY
(Open Elective-III)

COURSE OBJECTIVES

The objectives of this course

1. *To introduce the concept of cybercrime and its impact on information security, and provide an overview of cybercriminal behaviour and various classifications of cybercrimes.*
2. *To explore the methodologies used by cybercriminals to plan and execute attacks, including techniques like social engineering, botnets, and cloud-related threats.*
3. *To understand the security risks associated with mobile and wireless devices, and examine countermeasures for securing mobile computing in organizational environments.*
4. *To familiarize students with the tools and techniques used in committing cybercrimes, such as phishing, malware, DoS/DDoS attacks, and code-based exploits.*
5. *To analyse the implications of cybercrime for organizations, including the cost of cyber-attacks, intellectual property issues, and challenges posed by social computing and web-based threats*

COURSE OUTCOMES (COs)

At the end of the course, Student will be able to

1. *Understand the fundamentals of cybercrime and information security, and explain the legal and global perspectives, especially with reference to Indian IT Act 2000.*
2. *Analyze how cybercriminals plan and execute cyber offenses using techniques like social engineering, cyber stalking, and botnets, including threats posed by cloud computing.*
3. *Evaluate the security challenges of mobile and wireless devices and formulate measures to secure mobile environments within an organization.*
4. *Analyze Security Implications for Organizations.*
5. *Identify and explain various cyber-attack tools and methods such as phishing, key loggers, Trojans, and SQL injection used in committing cybercrimes.*
6. *Assess the organizational implications of cybercrimes, including IPR issues, social media risks, and formulate strategies to mitigate security and privacy challenges*

UNIT – I

Introduction to Cybercrime: Introduction, Cybercrime, and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT – II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones,

Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops

UNIT – IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT – V

Cyber Security: Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations

TEXT BOOKS

1. Nina Godbole and Sunil Belapure, *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,* Wiley INDIA

REFERENCES

1. James Graham, Richard Howard and Ryan Otson, *Cyber Security Essentials,* CRC Press.
2. Chwan-Hwa (john) Wu,J.DavidIrwin, *Introduction to Cyber Security,* CRC Press T&F Group

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(23HS0856) WAVELET TRANSFORMS AND ITS APPLICATIONS
(Open Elective -III)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the wavelet transform as an alternative approach to Fourier Transform*
2. *To understand Multi Resolution Analysis and Wavelet concepts*
3. *To study the wavelet transform in both continuous and discrete domain*
4. *To understand the design of wavelets using Lifting scheme*
5. *To understand the applications of Wavelet transform*

COURSE OUTCOMES

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

1. *Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms*
2. *Illustrate the multi resolution analysis ad scaling functions*
3. *Implement discrete wavelet transforms with multirate digital filters*
4. *Improve problem solving skills using discrete wavelet transform and filter banks.*
5. *Understand multi resolution analysis and identify various wavelets and evaluate their time – frequency resolution properties.*
6. *Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields.*

UNIT – I

Wavelets: Wavelets and Wavelet Expansion Systems - Wavelet Expansion - Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems - Haar Scaling Functions and Wavelets - effectiveness of Wavelet Analysis -The Discrete Wavelet Transform- The Discrete-Time and Continuous Wavelet Transforms.

UNIT– II

A Multi resolution Formulation of Wavelet Systems: Signal Spaces -The Scaling Function – Multi resolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

UNIT– III

Filter Banks and the Discrete Wavelet Transform: Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine

Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - Different Points of View.

UNIT – IV

Time-Frequency and Complexity: Multi resolution versus Time-Frequency Analysis- Periodic versus Non periodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

UNIT – V

Bases and Matrix Examples: Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

TEXT BOOKS

1. C. Sidney Burrus, Ramesh A. Gopinath, *Introduction to Wavelets and Wavelets Transforms*‖, Prentice Hall, 1997
2. James S. Walker, *A Primer on Wavelets and their Scientific Applications*‖, CRC Press, 1999

REFERENCES

1. Raghuveer Rao, *Wavelet Transforms*‖, Pearson Education, Asia
2. C. S. Burrus, Ramose and A. Gopinath, *Introduction to Wavelets and Wavelet Transform*, Prentice Hall Inc.

ONLINE LEARNING RESOURCES

http://users.rowan.edu/~polikar/WAVELETS/WTtutorial.html
http://www.wavelet.org/
http://www.math.hawaii.edu/~dave/Web/Amara's%20Wavelet%20Page.htm
https://jqichina.wordpress.com/wp-content/uploads/2012/02/ten-lectures-of
waveletsefbc88e5b08fe6b3a2e58d81e8aeb2efbc891.pdf

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(23HS0844) SMART MATERIALS AND DEVICES
(Open Elective-III)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide exposure to smart materials and their engineering applications.*
2. *To impart knowledge on the basics and phenomenon behind the working of smart materials*
3. *To explain the properties exhibited by smart materials.*
4. *To educate various techniques used to synthesize and characterize smart materials.*
5. *To identify the required smart material for distinct applications/devices.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Identify key discoveries that led to modern applications of shape memory materials, describe the two phases in shape memory alloys.*
2. *Describe how different external stimuli (light, electricity, heat, stress, and magnetism) influence smart material properties.*
3. *Summarize various types of synthesis of smart materials*
4. *Analyze the suitable method for synthesis of smart materials*
5. *Analyze various characterization techniques used for smart materials*
6. *Interpret the importance of smart materials in various devices*

UNIT– I

Introduction to Smart Materials: Historical account of the discovery and development of smart materials, Shape memory materials, chromoactive materials, magnetorheological materials, photoactive materials, Polymers and polymer composites (Basics).

UNIT – II

Properties of Smart Materials*:* Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT – III

Synthesis of Smart Materials: Chemical route: Chemical vapour deposition, Sol-gel technique, hydrothermal method, Mechanical alloying and Thin film deposition techniques: Sputtering and Spray pyrolysis.

UNIT – IV

Characterization Techniques: Powder X-ray diffraction, Raman spectroscopy (RS), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Atomic force microscopy (AFM).

UNIT– V

Smart Materials based Devices: Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

TEXT BOOKS

1. YaserDahman, *Nanotechnology and Functional Materials for Engineers-,* Elsevier, 2017
2. E. Zschech,C. Whelan, T. Mikolajick, *Materials for Information Technology: Devices,* Interconnects and Packaging Springer-Verlag London Limited 2005.

REFERENCES

1. Gauenzi,P., *Smart Structures,* Wiley, 2009.
2. Mahmood Aliofkhazraei, *Handbook of Functional Nanomaterials*, Vol (1&2), Nova Publishers, 2014
3. Chaudhery Mustansar Hussain, Paolo Di Sia, *Handbook of Smart Materials, Technologies, and Devices: Applications of industry, 4.0,* Springer, 2022.
4. Mohsen Shahinpoor, *Fundamentals of Smart Materials,* Royal Society of Chemistry, 2020

ONLINE LEARNING RESOURCES

https://onlinecourses.nptel.ac.in/noc22_me17/preview

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(23HS0846) INTRODUCTON TO QUANTUM MECHANICS
(Open Elective-III)

COURSE OBJECTIVES

The objectives of this course is

1. *To understand the fundamental differences between classical and quantum mechanics.*
2. *To study wave-particle duality, uncertainty principle, and their implications*
3. *To learn and apply Schrödinger equations to basic quantum systems*
4. *To use operator formalism and mathematical tools in quantum mechanics*
5. *To explore angular momentum, spin and their quantum mechanical representations.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain the key principles of quantum mechanics and wave-particle duality.*
2. *Apply Schrödinger equations to solve one-dimensional quantum problems*
3. *Analyze various types of operators.*
4. *Solve quantum mechanical problems using operator and matrix methods*
5. *Evaluate quantum states using Dirac notation and expectation values.*
6. *Analyze angular momentum and spin systems using Pauli matrices and operators.*

UNIT- I

Principles of Quantum Mechanics: Introduction: Limitations of classical Mechanics, black body radiation and origin of quantum theory of radiation. Wave-particle duality: de Broglie Hypothesis, Heisenberg uncertainty principle. Postulates of quantum mechanics, Physical significance of wave function (ψ), and Orthogonal, Normalized and Orthonormal functions. Schrödinger time independent and time dependent wave equation, Solution of the time dependent Schrödinger equation, Concept of stationary states

UNIT- II

One Dimensional Problems and Solutions: Potential step – Reflection and Transmission at the interface. Potential well: Square well potential with rigid walls, Square well potential with finite walls. Potential barrier and Periodic potential and Harmonic oscillator- Energy eigen functions and eigen values.

UNIT-III

Operator Formalism: Operators, Operator Algebra, Eigen values and Eigen vectors, Matrix representation of wave functions and linear operators.

UNIT- IV

Mathematical Tools for Quantum Mechanics: The concept of row and column matrices, Matrix algebra, Hermitian operators – definition. Dirac's bra and ket notation, Expectation values, Heisenberg (operator) representation of harmonic oscillator, Ladder operators and their significance.

UNIT- V

Angular Momentum and Spin: Angular momentum operators: Definition. Eigen functions and Eigen values of AM operators. Matrix representation of angular momentum operators, System with spin half (1/2), Spin angular momentum, Pauli's spin matrices. Clebsch-Gordon coefficients. Rigid Rotator: Eigen functions and Eigen values.

TEXT BOOKS

1. A. Messaia, *Quantum Mechanics. Vol 1,* Noth-Holland Pub. Co., Amsterdam, 1961.
2. P.M.Mathews and K.Venkatesam, *A Text Book of Quantum Mechanics*, Tata McGraw Hill, New Delhi, 1976.
3. R.H.Dicke and J.P.Witke, *Introduction to Quantum Mechanics,* Addison-Wisley Pub.Co.Inc., London, 1960.
4. S.L.Gupta, V.Kumar, H.V.Sarama and R.C.Sharma, *Quantum Mechanics*, Jai Prakash Nath & Co, Meerut, 1996.

REFERENCES

1. L.I. Schiff, *Quantum Mechanics,* McGraw Hill Book Co., Tokyo, 1968.
2. Richard L. Liboff, *Introduction to Quantum Mechanics*. Pearson Education Ltd, Fourth Edition, 2003.

ONLINE LEARNING RESOURCES

https://archive.nptel.ac.in/courses/115/101/115101107/
https://archive.nptel.ac.in/courses/122/106/122106034/
https://nptel.ac.in/courses/115106066

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B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

IV B.Tech – I Sem.

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(23HS0808) GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT
(Open Elective-III)

COURSE OBJECTIVES

The objectives of this course:

1. To understand principle and concepts of green chemistry.
2. To understand the types of catalysis and industrial applications.
3. To apply green solvents in chemical synthesis.
4. To enumerate different sourced of green energy.
5. To apply alternative greener methods foe chemical reactions.

COURSE OUTCOMES (COs)

By the end of the program students will be able to

1. Understand the basic concept and principle of green chemistry.
2. Analyze the concept of green chemistry in the catalytic industry.
3. Understand the importance of green synthesis.
4. Evaluate various recycling methods for green solvents to promote eco-friendly and cost-effective chemical processes.
5. Analyze the emerging green technologies in green chemistry.
6. Apply alternative green methods for green chemistry.

UNIT – I

Principles and Concepts of Green Chemistry: Introduction, Green chemistry Principles, sustainable development and green chemistry, E factor, atom economy, atom economic Reactions: Rearrangement and addition reactions and atom un- economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

UNIT – II

Catalysis and Green Chemistry: Introduction, Types of catalysis, Heterogeneous catalysis: Basics of Heterogeneous Catalysis, Zeolite and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, and Phase transfer catalysis, Bio- catalysis and Photo-catalysis with examples.

UNIT– III

Green Solvents in Chemical Synthesis: Green Solvents: Concept, Tools and techniques for solvent selection, supercritical fluids: Super critical carbon dioxide, super critical water, Polyethylene glycol (PEG), Ionic liquids, Recycling of green solvents.

UNIT – IV

Emerging Greener Technologies: Biomass as renewable resource, Energy: Energy from Biomass, Solar Power, Chemicals from Renewable Feedstock's, Chemicals from Fatty Acids, Polymers from Renewable Resources, Alternative Economies: The Syngas Economy, The Bio refinery, Design for energy efficiency, Mechanochemical synthesis.

UNIT – V

Alternative Greener Methods: Photochemical Reactions - Examples, Advantages and Challenges, Photoredox catalysis, single electron transfer reactions (SET), Examples of Photochemical Reactions, Microwave-assisted Reactions and Sonochemical reactions, examples and applications.

TEXT BOOKS

1. M. Lancaster, *Green Chemistry-An Introductory Text,* Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, *Green Chemistry Theory and Practice*, Oxford University Press, USA, 4th Edition

REFERENCES

1. Sanjay K. Sharma and Ackmez Mudhoo, *Green Chemistry for Environmental Sustainability*, First Edition, CRC Press, 2010.
2. Alvise Perosa and Maurizio Selva, *Hand Book of Green Chemistry, Volume-8,* Gre Nanoscience, Wiley-VCH, 2013

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(23HS0824) EMPLOYABILITY SKILLS
(Open Elective-III)

COURSE OBJECTIVES

1. *To encourage all-round development of the students by focusing on productive skills*
2. *To make the students aware of Goal setting and writing skills*
3. *To enable them to know the importance of presentation skills in achieving desired goals.*
4. *To help them develop organizational skills through group activities.*
5. *To function effectively with heterogeneous teams*

COURSE OUTCOMES

1. *Understand the importance of goals and try to achieve them.*
2. *Explain the significance of self-management.*
3. *Apply the knowledge of writing skills in preparing eye-catchy resumes.*
4. *Analyze various forms of Presentation skills.*
5. *Judge the group behavior appropriately.*
6. *Develop skills required for employability.*

UNIT – I

Goal Setting-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 Behavior- 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.

TEXT BOOKS

1. Sabina Pillai, Agna Fernandez, *Soft Skills & Employability Skills***,** Cambridge Publisher, 2014
2. AlkaWadkar, *Life Skills for Success,* Sage Publications, 2016.

REFERENCES

1. Gangadhar Joshi. *Campus to Corporate* Paper back, Sage Publications.2015
2. Sherfield Montogomery Moody, *Cornerstone Developing Soft Skills*, Pearson Publications, 4th edition, 2008
3. Shikha Kapoor, *Personality Development and Soft Skills – Preparing for Tomorrow*, 1st edition, Wiley, 2017.
4. M.Sen Gupta, *Skills for Employability,* Innovative Publication, 2019.
5. Steve Duck and David T McMahan**,** *The Basics of Communication Skills A Relational Perspective,* Sage Press, 2012.

ONLINE LEARNING RESOURCES

https://youtu.be/gkLsn4ddmTs
https://youtu.be/2bf9K2rRWwo
https://youtu.be/FchfE3c2jzc
https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
https://www.youtube.com/c/skillopedia/videos
https://onlinecourses.nptel.ac.in/noc25_hs96/preview
https://onlinecourses.nptel.ac.in/noc21_hs76/preview
https://archive.nptel.ac.in/courses/109/107/109107172/#
https://archive.nptel.ac.in/courses/109/104/109104107/

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(23EE0264) ELECTRIC VEHICLES
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of the course are

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

COURSE OUTCOMES (Cos)

On successful completion of the course, the student will be able to,

1. *To understand and differentiate between Conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.*
2. *Understand Various dynamics of Electric Vehicles*
3. *To remember and understand various configurations in parameters of EV system and dynamic aspects of EV*
4. *To analyse fuel cell technologies in EV and HEV systems*
5. *To analyse the battery charging and controls required of EVs*
6. *Classify different energy management strategies.*

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 1st edition, 2001.
2. Ali Emadi, ―*Advanced Electric Drive Vehicles*‖, CRC Press, 1st edition, 2017

REFERENCES

1. Iqbal Husain, *Electric and Hybrid Vehicles Design Fundamentals*, CRC Press, 3rd edition, 2021.
2. Francisco Díaz-González, Andreas Sumper, Oriol Gomis-Bellmunt, *Energy Storage in Power Systems*, Wiley Publication, ISBN: 978-1-118-97130-7, 1st edition, Mar 2016.
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 Elelctric, Hybrid Elelctric and Fuel Cell Vehicles: Fundamentals, Theory and Design*‖, CRC Press, 1st edition, 2017.
5. James Larminie, John Lowry, *.Electric Vehicle Technology Explained*‖, Wiley, 2nd edition, 2003

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/108/102/108102121/

https://nptel.ac.in/syllabus/108103009

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(23ME0351) TOTAL QUALITY MANAGEMENT
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of the course are

1. *To introduce the fundamental concepts, definitions, and dimensions of quality and Total Quality Management (TQM).*
2. *To explore the evolution of quality management through historical perspectives and contributions of quality gurus.*
3. *To explain the core principles of TQM including customer satisfaction, employee involvement, and continuous improvement.*
4. *To analyze the various TQM tools such as Benchmarking, QFD, FMEA, Six Sigma, and their role in quality enhancement.*
5. *To provide an understanding of quality systems like ISO 9000, ISO 14000, QS 9000, and the processes for their implementation.*

COURSE OUTCOMES (COs)

On successful completion of the course, the student will be able to,

1. *Define and explain the basic concepts of quality, quality costs, and the scope of Total Quality Management.*
2. *Summarize the philosophies and contributions of TQM pioneers and evaluate barriers and enablers for TQM implementation.*
3. *Apply TQM principles such as employee empowerment, customer satisfaction, and supplier partnerships to real-world business scenarios.*
4. *Analyze the application of tools like QFD, FMEA, Six Sigma, and Benchmarking in improving product and process quality.*
5. *Evaluate and formulate quality systems like ISO 9000 and ISO 14000, and design documentation and auditing processes.*
6. *Apply the tools and technics of the quality management to manufacturing and service process and to provide quality components at lowest cost*

UNIT – I

Introduction: Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs – Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

UNIT – II

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy,

Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader, Contributions of Gurus of TQM, Case studies

UNIT – III

TQM Principles: Customer Satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment teams, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure Case studies.

UNIT – IV

TQM Tools: Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

UNIT – V

Quality Systems: Need for ISO 9000 and Other Quality Systems, ISO 9000: 2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits, Case Studies

TEXT BOOKS

1. Dale H Besterfield, *Total Quality Management*, Pearson Education, Fourth edition, 2015.
2. Subburaj Ramaswamy, *Total Quality Management*, Tata McGraw Hill Publishing Company Ltd., 2005.
3. Joel E.Ross , *Total Quality Management*, CRC Press, Third edition, 2017.

REFERENCES

1. Narayana V and Sreenivasan N.S, *Quality Management – Concepts and Tasks*, New Age International, 1996.
2. Robert L.Flood, *Beyond TQM*, John Wiley & Sons Ltd, First edition, 1993.
3. Richard S. Leavenworth & Eugene Lodewick Grant, *Statistical Quality Control*, Tata McGraw Hill, Seventh edition, 2015
4. Samuel Ho, *TQM – An Integrated Approach*, Kogan Page Ltd, USA, 1995.

ONLINE LEARNING RESOURCES

https://www.youtube.com/watch?v=VD6tXadibk0

https://www.investopedia.com/terms/t/total-quality-management-tqm.asp

https://blog.capterra.com/what-is-total-quality-management/
https://nptel.ac.in/courses/110/104/110104080/
https://onlinecourses.nptel.ac.in/noc21_mg03/preview
https://nptel.ac.in/courses/110/104/110104085/
https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-mg39/

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(23EC0442) TRANSDUCERS AND SENSORS
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of this course are

1. *To understand characteristics of Instrumentation System and the operating principle of motion transducers.*
2. *To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.*
3. *To provide knowledge on flow transducers and their applications.*
4. *To study the working principles of pressure transducers.*
5. *To introduce working principle and applications of force and sound transducers.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Understand characteristics of Instrumentation System and the operating principle of motion transducers.*
2. *Explore working principles, and applications of different temperature transducers and Piezo-electric sensors.*
3. *Gain knowledge on flow transducers and their applications.*
4. *Learn the working principles of pressure transducers.*
5. *Understand the working principle and applications of force and sound transducers.*
6. *Analyze and select appropriate transducers based on application requirements, standards, calibration methods, and performance characteristics for industrial and biomedical instrumentation systems.*

UNIT-I

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

UNIT-II

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics. Hall effect transducers, Digital transducers, Proximity devices, Bio sensors,

Smart sensors, Piezo-electric sensors.

UNIT-III

Flow Transducers: Bernoulli‘s principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

UNIT-IV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

UNIT-V

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

TEXT BOOKS

1. A.K.Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai & Co., 3rd edition, Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, *Instrumentation Devices and Systems*‖, TATA McGraw Hill Publications, 2007.

REFERENCES

1. Doebelin.E.O, *Measurement Systems Application and Design,* McGraw Hill International, New York, 2004.
2. Nakra B.C and Chaudhary K.K, *Instrumentation Measurement and Analysis,* Tata McGraw-Hill Publication Ltd., Second edition, 2006.

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(23CS0558) INTRODUCTION TO COMPUTER NETWORKS
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of this course are

1. *Understand the basic concepts of Computer Networks.*
2. *Introduce the layered approach for design of computer networks*
3. *Expose the network protocols used in Internet environment*
4. *Explain the format of headers of IP, TCP and UDP*
5. *Familiarize with the applications of Internet*
6. *Elucidate the design issues for a computer network*

COURSE OUTCOMES (COs)

After completion of the course, students will be able to

1. *Identify the software and hardware components of a computer network*
2. *Design software for a computer network*
3. *Develop error, routing, and congestion control algorithms*
4. *Assess critically the existing routing protocols*
5. *Explain the functionality of each layer of a computer network*
6. *Choose the appropriate transport protocol based on the application requirements*

UNIT-I

What Is the Internet? Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks (Textbook 2), Reference Models, Multimedia Networks, Guided Transmission Media, Wireless Transmission (Textbook 1)

UNIT-II

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols (Textbook 1) Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page (Packet) (Textbook 2)

UNIT-III

The Network Layer: Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1)

UNIT-IV

The Transport Layer: Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1)

UNIT-V

The Application Layer: Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications, Video Streaming and Content Distribution Networks (Textbook 2)

TEXT BOOKS

1. Andrew S. Tanenbaum, David J. Wetherall, *Computer Networks*, 6th edition, Pearson.
2. James F. Kurose, Keith W. Ross, *Computer Networking: A Top-Down Approach*, 6th edition, Pearson, 2019.

REFERENCES

1. Forouzan, *Data Communications and Networking*, McGraw Hill Publication, 5th edition
2. Youlu Zheng, Shakil Akhtar, *Networks for Computer Scientists and Engineers*, Oxford Publishers, 2016.

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/106105183/25
https://www.nptelvideos.in/2012/11/computer-networks.html
https://nptel.ac.in/courses/106105183/3

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(23CS0545) INTERNET OF THINGS
(Open Elective - IV)

COURSE OBJECTIVES

1. Understand the basics of Internet of Things and protocols.
2. Discuss the requirement of IoT technology
3. Introduce some of the application areas where IoT can be applied.
4. Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management

COURSE OUTCOMES (COs)

After completion of the course, students will be able to
1. Understand general concepts of Internet of Things.
2. Apply design concept to IoT solutions
3. Analyze various M2M and IoT architectures
4. Evaluate design issues in IoT applications
5. Create IoT solutions using sensors, actuators and Devices
6. Demonstrate the use of communication protocols and data handling techniques in IoT systems

UNIT- I

Introduction to IoT: Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates

UNIT- II

Prototyping IoT Objects using Microprocessor/Microcontroller: Working principles of sensors and actuators, setting up the board – Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

UNIT-III

IoT Architecture and Protocols: Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LowPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

UNIT- IV

Device Discovery and Cloud Services for IoT: Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

UNIT- V

UAV IoT: Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller(ESC), GPS, IMU, Ultra sonic sensors; UAV Software –Arudpilot, Mission Planner, Internet of Drones(IoD)- Case study FlytBase.

TEXT BOOKS

1. Vijay Madisetti and Arshdeep Bahga, *Internet of Things (A Hands-on Approach),* 1st edition, VPT, 2014.
2. K. Valavanis and George J. Vachtsevanos, *Handbook of Unmanned Aerial Vehicles,* Springer, Boston, Massachusetts: Credo Reference, 2016.

REFERENCES

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, *From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence,* Academic Press, 1st edition, 2014.
2. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2014.
3. Pethuru Raj, Anupama C. Raman, *The Internet of Things: Enabling Technologies and Use Cases*, CRC Press.
4. Francis daCosta, *Rethinking the Internet of Things: A Scalable Approach to Connecting Everything*, Apress Publications, 1st edition, 2013.
5. Cuno Pfister, *Getting Started with the Internet of Things*, O'Reilly Media, 2011. ISBN: 978-1-4493-9357-1.
6. *DGCA RPAS Guidance Manual*, Revision 3, 2020.
7. John Baichtal, *Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs*, Que Publishing.

ONLINE LEARNING RESOURCES

https://www.arduino.cc/
https://www.raspberrypi.org/
https://nptel.ac.in/courses/106105166/5
https://nptel.ac.in/courses/108108098/4

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(23CS0557) INTRODUCTION TO QUANTUM COMPUTING
(Open Elective - IV)

COURSE OBJECTIVES:

The objectives of this course are

1. *To introduce the principles and mathematical foundations of quantum computation.*
2. *To understand quantum gates, circuits, and computation models.*
3. *To explore quantum algorithms and their advantages over classical ones.*
4. *To develop the ability to simulate and write basic quantum programs.*
5. *To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.*

COURSE OUTCOMES (COs)

After completion of the course, students will be able to

1. *Explain the fundamental concepts of quantum mechanics used in computing.*
2. *Construct and analyze quantum circuits using standard gates.*
3. *Apply quantum algorithms like Deutsch-Jozsa, Grover's, and Shor's.*
4. *Analyze bays classifier algorithm*
5. *Develop simple quantum programs using Qiskit or similar platforms.*
6. *Analyze applications and challenges of quantum computing in real-world domains.*

UNIT-I

Fundamentals of Quantum Mechanics and Linear Algebra: Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation, Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT-II

Quantum Gates and Circuits: Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility, Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT-III

Quantum Algorithms and Complexity: Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover's Search Algorithm, Shor's Factoring Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT-IV

Quantum Programming and Simulation Platforms: Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Results, Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State of Quantum Hardware.

UNIT-V

Applications and Future of Quantum Computing: Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum Technologies, Future Trends and Research Directions.

TEXT BOOKS

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.

REFERENCES

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.

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

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(23HS0857) FINANCIAL MATHEMATICS
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide mathematical foundations for financial modeling, risk assessment and asset pricing.*
2. *To introduce stochastic models and their applications in pricing derivatives and interest rate modelling.*
3. *To develop analytical skills for fixed-income securities, credit risk, and investment strategies.*
4. *To equip students with computational techniques for pricing financial derivatives.*

COURSE OUTCOMES (COs)

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

1. *Explain fundamental financial concepts, including arbitrage, valuation, and risk.*
2. *Apply stochastic models, including Brownian motion and Stochastic Differential Equations (SDEs), in financial contexts.*
3. *Analyze mathematical techniques for pricing options and financial derivatives.*
4. *Apply model credit risk concept in various contexts, such as loan portfolios*
5. *Evaluate interest rate models and bond pricing methodologies.*
6. *Utilize computational techniques such as Monte Carlo simulations for financial modeling.*

UNIT-I

Asset Pricing and Risk Management: Fundamental financial concepts: Returns, arbitrage, valuation, and pricing. Asset/Liability management, investment income, capital budgeting, and contingent cash flows - One-period model: Securities, payoffs, and the no-arbitrage principle. Option contracts: Speculation and hedging strategies, CAP Model, Efficient market hypothesis.

UNIT-II

Stochastic Models in Finance: Random Walks and Brownian Motion. Introduction to Stochastic Differential Equations (SDEs): Drift and diffusion. Ito calculus: Ito‘s Lemma, Ito Integral, and Ito Isometry.

UNIT-III

Interest Rate and Credit Modelling: Interest rate models and bond markets. Short-rate models: Vasicek, Cox-Ingersoll-Ross (CIR), Hull & White models, Credit risk modelling: Hazard function and hazard rate.

UNIT-IV

Fixed-Income Securities and Bond Pricing: Characteristics of fixed-income products: Yield, duration, and convexity. Yield curves, forward rates, and zero-coupon bonds. Stochastic interest rate models and bond pricing PDE. Yield curve fitting and calibration techniques, Mortgage Backed Securities.

UNIT-V

Exotic Options and Computational Finance: Stochastic volatility models and the Feynman-Kac theorem. Exotic options: Barriers, Asians, and Look backs. Monte Carlo methods for derivative pricing, Black-Scholes-Merton model: Derivation and applications.

TEXT BOOKS

1. Ales Cerny, *Mathematical Techniques in Finance: Tools for Incomplete Markets*, Princeton University Press
2. S.R. Pliska, *Introduction to Mathematical Finance: Discrete-Time Models*, Cambridge University Press

REFERENCES

1. Ioannis Karatzas & Steven E. Shreve, *Methods of Mathematical Finance*, Springer, New York.
2. John C. Hull, *Options, Futures, and Other Derivatives*, Pearson.

WEB REFERENCES

MIT– Mathematics for Machine Learning https://ocw.mit.edu
Coursera – Financial Engineering and Risk Management (Columbia University)
https://www.coursera.org/
National Stock Exchange (NSE) India – Financial Derivatives https://www.nseindia.com/

R23

B.Tech-CE

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

IV B.Tech – I Sem.

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(23HS0845) SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide exposure to various kinds of sensors and actuators and their engineering applications.*
2. *To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators*
3. *To explain the operating principles of various sensors and actuators*
4. *To educate the fabrication of sensors*
5. *To explain the required sensor and actuator for interdisciplinary application.*

COURSE OUTCOMES (COs)

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

1. Classify different types of Sensors and Actuators along with their characteristics.
2. Summarize various types of Temperature and Mechanical sensors.
3. Illustrates various types of optical and mechanical sensors
4. Analyze various types of Optical and Acoustic Sensors
5. Explain various types of Magnetic and Electromagnetic Sensors.
6. Interpret the importance of smart materials in various devices

UNIT - I

Introduction to Sensors and Actuators: Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only).Actuators: Functional diagram of actuators, Types of actuators and their basic principle of working: Pneumatic, Electromagnetic, Piezo-electric and Piezo-resistive actuators, Applications of Actuators.

UNIT - II

Temperature and Mechanical Sensors: Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo- resistive sensors: Thermistors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors. Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors: Strain gauges, Tactile sensors, Pressure sensors: Piezoresistive, Variable Reluctance Sensor (VRP).

UNIT - III

Optical and Acoustic Sensors: Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo resistors based sensors, Photomultipliers, Infrared sensors: thermal, Passive Infra-Red, Fiber based sensors and Thermopiles Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones

UNIT - IV

Magnetic and Electromagnetic Sensors: Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magnetostrictive sensors and actuators.

UNIT - V

Chemical and Radiation Sensors:

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Radiation Sensors: Principle and working of Ionization detectors, Scintillation detectors, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

TEXT BOOKS

1. Clarence W. de Silva, *Sensors and Actuators*, CRC Press, 2nd edition, 2015
2. D.A.Hall and C.E.Millar, *Sensors and Actuators*, CRC Press, 1999

REFERENCES

1. D.Patranabhis, *Sensors and Transducers,* Prentice Hall of India (Pvt) Ltd. 2003
2. John G.Webster, *Measurement, Instrumentation, and Sensors Handbook, CRC Press 1999*
3. Henry Bolte, *Sensors – A Comprehensive Sensor,* John Wiley.
4. Stefan Johann Rupitsc, . *Handbook of Modern Sensors,* Springer

NPTEL COURSE LINK

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B.Tech-CE

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IV B.Tech – I Sem.

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(23HS0809) CHEMISTRY OF NANO MATERIALS AND APPLICATIONS
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand basics and characterization of nanomaterials.*
2. *To understand synthetic methods of nanomaterials.*
3. *To apply various techniques for characterization of nanomaterials.*
4. *To understand Studies of Nano-structured Materials.*
5. *To enumerate the applications of advanced nanomaterials in engineering.*

COURSE OUTCOMES (COs)

By the end of the program students will be able to

1. *Understand the basic concepts and classification of nanomaterials.*
2. *Analyze the synthesis of a nanomaterial's using various methods comparing and evaluating their effectiveness.*
3. *Apply various instrumental methods to cauterize nanomaterials and interpret the result.*
4. *Apply the BET method for surface area and porosity analysis of nanomaterials and porous solids.*
5. *Apply knowledge of synthesis, properties and applications of various nanomaterials.*
6. *Evaluate the applications of nano materials in various fields and their benefits in day to day Life.*

UNIT – I

Basics and Characterization of Nanomaterials: Introduction, Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nanomaterials

UNIT – II

Synthesis of Nanomaterials: Top-Down approach, Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electro deposition method, high energy ball milling method.

Synthetic Methods: Bottom-Up approach, Sol-gel synthesis, micro emulsions or reverse micelles, co-precipitation method, solvo thermal synthesis, hydrothermal synthesis, microwave heating synthesis and sono chemical synthesis.

UNIT – III

Techniques for Characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT – IV

Studies of Nano-Structured Materials: Synthesis, properties and applications of the following nanomaterials -fullerenes, carbon nanotubes, 2D-nanomaterial (Graphene), core-shell, magnetic nanoparticles, thermoelectric materials, non-linear optical materials.

UNIT – V

Advanced Engineering Applications of Nanomaterials:

Applications of Nano Particle: Nanorods and Nano wires in Water treatment, sensors, electronic devices, medical domain. Applications of Nano Particle in Civil engineering-Enhancing concrete properties, chemical engineering-Drug delivery, metallurgy and mechanical engineering-Enhanced material properties, food science, agriculture, pollutants degradation

TEXT BOOKS

1. T Pradeep, *NANO: The Essentials:*, McGraw Hill, 2007.
2. B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, *Textbook of Nanoscience and Nanotechnology,* Univ. Press, 2012.

REFERENCES

1. Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, *Concepts of Nano chemistry,* Wiley-VCH, 2011.
2. Guozhong Cao, *Nanostructures & Nanomaterials; Synthesis, Properties & Applications,* Imperial College Press, 2007.

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IV B.Tech – I Sem.

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(23HS0825) LITERARY VIBES
(Open Elective - IV)

COURSE OBJECTIVES

The objectives of the course are

1. *To inculcate passion for aesthetic sense and reading skills.*
2. *To encourage respecting others' experiences and creative writing.*
3. *To explore emotions, communication skills and critical thinking.*
4. *To educate how books serve as the reflection of history and society.*
5. *To provide practical wisdom and duty of responding to events of the times.*

COURSE OUTCOMES (COs)

On successful completion of this course the student will be able to:

1. *Identify genres, literary techniques and creative uses of language in literary texts.*
2. *Explain the relevance of themes found in literary texts to contemporary Personal and cultural values and to historical forces.*
3. *Apply knowledge and understanding of literary texts when responding to others' problems and their own and make evidence-based arguments.*
4. *Analyze the underlying meanings of the text by using the elements of literary text*
5. *Evaluate their own work and that of others critically.*
6. *Develop as creative, effective, independent and reflective students who are able to make informed choices in process and performance.*

UNIT – I

Poetry

1. Ulysses - Alfred Lord Tennyson
2. Ain't I woman?-Sojourner Truth
3. The Second Coming-W.B. Yeats
4. Where the Mind is Without Fear-Rabindranath Tagore

UNIT – II

Drama

Twelfth Night-William Shakespeare

1. Shakespeare- life and works
2. Plot & sub- plot and Historical background of the play
3. Themes and Criticism
4. Style and literary elements

5. Characters and characterization

UNIT – III

Short Story

1. The Luncheon –Somerset Maugham
2. The Happy Prince- Oscar Wild
3. Three Questions – Leo Tolstoy
4. Grief–Antony Chekov

UNIT – IV

Prose: Essay and Auto-biography

1. My struggle for an Education-Booker T Washington
2. The Essentials of Education-Richard Livingston
3. The story of My Life-Helen Keller
4. Student Mobs-J B Priestly
5. My Days: A Memoir

UNIT – V

Novel: Hard Times-Charles Dickens

1. Charles Dickens-Life and works
2. Plot and Historical back ground of the novel
3. Themes and criticism
4. Style and literary elements
5. Characters and characterization

TEXT BOOKS

1. Charles Dickens, *Hard Times,* (Sangam A bridged Texts) Vantage Press, 1983
2. William Shakespeare, Dentjc, *Twelfth Night*, Oxford University Press, 2016.

REFERENCES

1. WJ Long, *History of English Literature*, Rupa Publications India, First edition, 4th October, 2015
2. R K Kaushik and SC Bhatia, *Essays, Short Stories and One Act Plays*, Oxford University Press, 2018.
3. Dhanvel, S P, *English and Soft Skills,* Orient Blackswan, 2017.
4. New Horizon, Pearson publications, New Delhi, 2014
5. Vimala Ramarao, *Explorations Volume-II,* Prasaranga Bangalore University, 2014.
6. DevNeira, Anjana & Co., *Creative Writing: A Beginner's Manual,* Pearson India, 2008.
7. Narayan, R. K., *My days: A memoir*, New Delhi: Indian Thought Publications, 1974.

ONLINE LEARNING RESOURCES

https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses
https://www.litcharts.com/lit/ain-t-i-a-woman/summary-and-analysis
https://englishliterature.education/articles/poetry-analysis/the-second-coming-by-w-b-yeats-critical-analysis-summary-and-line-by-line-explanation/#google_vignette
https://sirjitutorials.com/where-the-mind-is-without-fear-poem-notes-explanation/
https://www.litcharts.com/lit/twelfth-night/themes
https://smartenglishnotes.com/2021/11/28/the-luncheon-summary-characters-themes-and-irony/

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B.Tech-CE

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(23CE0160) SOIL DYNAMICS AND MACHINE FOUNDATION

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamentals of vibration and response of single/multiple-degree-of-freedom systems.*
2. *Analyze the wave propagation in soil deposits and evaluate dynamic soil properties.*
3. *Perform vibration analyses for machine foundations, considering different loading conditions.*
4. *Design block foundations for reciprocating and impact machines based on codal provisions.*
5. *Analyze and design machine foundations on piles, considering different modes of vibration.*

COURSE OUTCOMES (COs)

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

1. *Analyze SDOF/MDOF systems for free and forced vibrations, incorporating viscous damping effects and transient excitations.*
2. *Analyze seismic wave propagation and evaluate dynamic soil properties.*
3. *Analyze vibratory behaviour of foundation systems considering soil pressure, amplitude limits, and footing shape effects.*
4. *Assess dynamic analysis techniques are lumped mass models and elastic half-space theory to evaluate vibration isolation and the dynamic response of embedded block foundations.*
5. *Design machine foundations for reciprocating and impact-type machines.*
6. *Analyze the response of pile-supported machine foundations and develop design solutions.*

UNIT – I

Fundamentals of Vibration: Definitions, Simple Harmonic Motion, Response of SDOF Systems of Free and Forced Vibrations with And Without Viscous Damping, Frequency Dependent Excitation, Systems Under Transient Loads, Rayleigh ‘s Method of Fundamental Frequency, Logarithmic Decrement, Determination of Viscous Damping, Transmissibility, Systems with Two and Multiple Degrees of Freedom, Vibration Measuring Instruments.

UNIT – II

Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits - Attenuation of stress waves, Stress-strain behavior of cyclically loaded soils, Strength of cyclically loaded soils, Dynamic soil properties - Laboratory and field-testing techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sand, gravels, clays and lightly cemented sand. Liquefaction of soils: An introduction and evaluation using simple methods.

UNIT – III

Vibration Analyses: Types, General Requirements, Permissible amplitude, Allowable soil pressure, Modes of vibration of a rigid foundation block, Methods of analysis, Lumped Mass models, elastic half space method, Elasto-dynamics, effect of footing shape on vibratory response, dynamic response of embedded block foundation, Vibration isolation

UNIT – IV

Design of Machine Foundations: Analysis and design of block foundations for reciprocating engines, Dynamic analysis and design procedure for a hammer foundation, IS code of practice design procedure for foundations of reciprocating and impact type machines. Vibration isolation and absorption techniques

UNIT – V

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Analysis of piles under torsion, Design procedure for a pile supported machine foundation.

TEXT BOOKS

1. S. Prakash, *Soil Dynamics*, McGraw Hill, 1st edition, 1981.
2. F. E. Richart, J. R. Hall, and R. D. Woods, *Vibrations of Soils and Foundations*, Prentice Hall Inc., 1st edition, 1970.

REFERENCES

1. Chowdhary and S. P. Dasgupta, *Dynamics of Structures and Foundation*, 1st edition, 2009.
2. Swami Saran, *Soil Dynamics and Machine Foundation*, Galgotia Publishing, 2nd edition, 1999
3. S. Prakash and V. K. Puri, *Foundation for Machines: Analysis and Design*, John Wiley & Sons, 1st edition, 1998.
4. N. S. V. Kameswara Rao, *Vibration Analysis and Foundation Dynamics,* Wheeler Publishing Ltd., 1st edition, 1998.
5. S. L. Kramer, *Geotechnical Earthquake Engineering*, CRC Press, 2nd edition, 2024

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/105101005

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(23CE0161) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the various sources and characteristics of industrial wastewater and its impacts on natural water bodies and sewer systems.*
2. *Explain and differentiate primary and preliminary treatment methods for industrial effluents.*
3. *Illustrate advanced treatment techniques including nutrient and heavy metal removal.*
4. *Examine and summarize the characteristics and treatment needs of effluents from major industries like sugar, steel, petroleum, textiles, and tanneries.*
5. *Develop awareness of common effluent treatment plants (CETPs), their design considerations, and operational challenges.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Analyze sources and characteristics of industrial and municipal wastewater to evaluate their impact on sewers and natural water bodies.*
2. *Adapt primary and advanced treatment methods to remove pollutants and ensure safe disposal or reuse of industrial wastewater.*
3. *Assess the manufacturing processes and origin of effluents from agro-based and processing industries.*
4. *Suggest suitable treatment strategies based on the characteristics and composition effluents from agro-based and processing industries*
5. *Evaluate the manufacturing processes and liquid waste characteristics of various heavy processing industries for effective effluent management.*
6. *Design and evaluate CETPs, reuse, recycling, and ZLD strategies for sustainable wastewater management.*

UNIT – I

Wastewater Sources and Characteristics: Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Sources and Flow Rates of Municipal Wastewater - Characteristics of Municipal Wastewater - Effects of industrial effluents on sewers and Natural water Bodies

UNIT – II

Pre-Treatment and Primary Treatment Methods: Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-

Strength Reduction. Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT – III

Effluents from Agro and Processing Industries: Manufacturing Process and liquid waste origin, Characteristics and Composition from Textiles, Paper and Pulp industries, Sugar Mills, Tanneries, Dairy and Oil Refineries

UNIT – IV

Effluent Characteristics from Heavy Industries: Manufacturing Process and liquid waste origin, Characteristics and Composition from Steel, Pharmaceutical Plants, Petroleum Refineries, Atomic Energy Plants and other Mineral Processing Industries.

UNIT – V

Integrated Wastewater Management and CETP Approaches: Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants (CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects. Development of integrated treatment for waste water – zero polluting industry concept – Reuse and recycle of waste water.

TEXT BOOKS

1. Rao, M.N. & Dutta, A.K., *Waste Water Treatment*‖, IBH Publishers, 3rd edition, 2020.
2. Patwardhan, *Industrial Waste Water Treatment*‖, PHI learning Pvt. Ltd, 2017

REFERENCES

1. Metcalf, L., and Eddy, P. *Wastewater Engineering; Treatment and Reuse*, Tata McGraw-Hill, New Delhi, 5th edition, 2013.
2. Arceivala, S. J. and Asolekar, S. R. Wastewater Treatment for Pollution Control. McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 3rd edition, 2006.
3. Bureau of Indian Standards for analysis of water and wastewater (IS3025)
4. Anil K. De. *Environmental Chemistry,* New Age International Ltd., New Delhi, 2023
5. Hammer, Mark J. *Water and Wastewater Technology*, Prentice Hall, New Jercy, 2013

ONLINE LEARNING RESOURCES

https://onlinecourses.nptel.ac.in/noc24_ce53/preview
https://onlinecourses.nptel.ac.in/noc21_ce25/preview

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B.Tech-CE

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(AUTONOMOUS)

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(23CE0162) REPAIR & REHABILITATION OF STRUCTURES

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the causes of deterioration and distress in concrete structures and the importance of rehabilitation.*
2. *Familiarize with condition/damage assessment and evaluation techniques using NDT and field/lab tests.*
3. *Gain knowledge on the selection and application of suitable materials and techniques for concrete repair.0*
4. *Learn various rehabilitation and retrofitting methods including case studies and demolition techniques.*
5. *Understand the importance of protection, maintenance, and structural health monitoring (SHM) for ensuring long-term durability.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Identify the causes and mechanism of deterioration in concrete structures*
2. *Assess the condition of structures using various evaluation techniques and non-destructive testing methods.*
3. *Apply appropriate repair materials and methodologies for different types of structural defects.*
4. *Implement numerous preventive actions for corrosion-damaged structures.*
5. *Implement repair and retrofitting techniques to enhance the structural integrity and extend the service life of structures and also to apply different techniques for repair and demolition.*
6. *Evaluate how corrosion reduction, preventative maintenance, and SHM might improve the service life of structures.*

UNIT – I

Introduction: Deterioration of structures with aging, Need for rehabilitation - Deterioration of concrete structures: Causes of distress Causes of distress in concrete structures, construction and design failures, Distress in concrete due to physical and chemical deterioration. Deterioration due to water leakage, fire – detection & mitigation of the same -Visual deterioration of structures- Types of cracks, causes & characteristics of cracking in various structural components. Measurement of cracks as per IS 456 - interpretation of the cause of particular type of crack

UNIT – II

Conditional/Damage Assessment & Evaluation of Structures: Condition assessment and distress-diagnostic techniques, Field & laboratory testing procedures for evaluating the structure for strength, corrosion activity, performance & integrity, durability by use of NDT equipments

UNIT – III

Materials for Repair Materials: Criteria for durable concrete repair, Methodology, selection of repair materials, Preparatory stage of repairs, Different types of repair materials & their application, types of repair techniques - Corrosion damage of reinforced concrete - repair and prevention measures - Surface deterioration, Efflorescence, causes, prevention and protection Surface coatings and painting - Water proofing

UNIT – IV

Rehabilitation Methods: Retrofitting, RCC Jacketing, Fibre wrapping, Building and restoration of earthquake damaged masonry structure, Method for foundation rehabilitation; Case studies - Demolition techniques : Engineered demolition techniques for Dilapidated structures – case studies.

UNIT – V

Protection & Maintenance of Structures: Deterioration due to ageing, inadequate maintenance Facets of Maintenance, importance of Maintenance various aspects of Inspection. Corrosion mitigation techniques to protect the structure from corrosion - Long term health monitoring / Structural health monitoring (SHM)– Definition maintenance of structures and motivation for SHM, Basic components of SHM and its working mechanism.

TEXT BOOKS

1. B. Bhattacharjee, *Concrete Structures - Repair, Rehabilitation and Retrofitting,* CBS Publishers and Distributors Pvt Ltd, 2020
2. R. Dodge Woodson, *Concrete Structures - Protection, Repair and Rehabilitation*, Elsevier, 2009

REFERENCES

1. CPWD, *Handbook on Repair and Rehabilitation of RCC Buildings*, Govt of India Press, New Delhi, 2014.
2. Allen, Harold Roper, and Denison Campbell, *Concrete Structures: Materials, Maintenance and Repair,* Longman Scientific and Technical, UK, 1st edition, 1991
3. W. H. Ranson, *Building Failures – Diagnosis and Avoidance,* E. & F.N. Spon, 1987
4. R. Holland, *Appraisal and Repair of Reinforced Concrete*, Thomas Telford Ltd., 1997

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B.Tech-CE

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(23CE0163) DESIGN AND DRAWING OF IRRIGATION STRUCTURES

COURSE OBJECTIVES

The objectives of this course is to

1. *Impart fundamental knowledge on various irrigation systems, soil moisture concepts, and canal design principles.*
2. *Provide an understanding of the design aspects of diversion head works and their components.*
3. *Introduce the functional and structural design of canal structures and cross-drainage works.*
4. *Develop analytical skills in assessing the design and safety of storage head works, including gravity and earth dams.*
5. *Explain the importance and design aspects of spillways and energy dissipation arrangements in hydraulic structures.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Design lined canals and longitudinal sections, and apply principles for stable irrigation canals.*
2. *Design diversion head works and vertical drop weir with silt control*
3. *Analyze the purpose and working of canal regulators, falls ad cross drainage works in canal systems*
4. *Design a Sarada type fall and other basic canal structures using hydraulic principles.*
5. *Analyze gravity dams and perform stability and seepage analysis for earth dams*
6. *Apply types and principles of spillways and energy dissipators*

UNIT – I

Irrigation Systems: Types of irrigation systems, Soil moisture, Irrigation water requirements, Irrigation efficiencies, Methods of application of irrigation water, Water logging – Causes and remedial measures - Canal Systems: Types of canals, Principles of design of stable irrigation canals, Silt theories, Tractive force theory, Design of lined canal, Design of longitudinal section

UNIT – II

Design of Diversion Head Works: Types of hydraulic structures, Layout of a diversion head work, Design of vertical drop weir, Silt control in head works

UNIT – III

Design of Canal Structures: Canal regulators, Types of canal falls, Design of Sarda type fall, Types of cross drainage works.

UNIT – IV

Storage Head Works: Types of storage head works, Forces acting on gravity dams, Analysis of gravity dams, Profile of a gravity dam Earth dams: Types of earth dams, Causes of failure of earth dams, Seepage analysis, Seepage control, Stability analysis

UNIT – V

Spillways and Energy Dissipation Systems: Types of spillways, Ogee spillway, Principles of energy dissipators

TEXT BOOKS

1. Modi, P. N., *Irrigation Water Resources and Hydropower Engineering*, Standard Book Publishing Company, New Delhi, 2023
2. Asawa, G. L., *Irrigation Engineering*, New Age International Publishing Company, New Delhi, 2012

REFERENCES

1. Arora, K. L., *Irrigation Water Resources Engineering*, Standard Book Publishing Company, New Delhi, 2023
2. Murthy, C. S. N., *Water Resources Engineering – Principles and Practice*, New Age International Publishing Company, New Delhi, 2019
3. C. Satyanarayana Murthy, *Design of Minor Irrigation and Canal Structures*, Wiley Eastern Ltd.,

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(23CE0164) ROAD SAFETY ENGINEERING

COURSE OBJECTIVES

The objective of this course is to

1. *Provide foundational knowledge about the causes and trends of road accidents and the impact of human, vehicle, and roadway factors on highway safety.*
2. *Introduce statistical tools and procedures for interpreting and analysing crash data including black spot and hotspot investigations.*
3. *Explain the principles and components of road safety management systems and the role of audits and crash investigations.*
4. *Impart understanding of crash reconstruction techniques using physical evidence, kinematic principles, and accident scenarios.*
5. *Promote awareness of safety improvement measures in highway planning, design, operation, and enforcement including policy and stakeholder roles.*

COURSE OUTCOMES (COs)

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

1. *Assess highway safety by considering various factors that can cause road accidents.*
2. *Analyze statistical methods for crash data analysis and conduct black spot and hotspot identification with case-based insights.*
3. *Implement road safety management systems and audit procedures, emphasizing data-driven strategies for enhancing intersection performance and overall traffic safety.*
4. *Analyze hazardous road locations using crash data and case studies, and recommend targeted improvements for work zones and roadway safety.*
5. *Analyze crash reconstruction cases using physical evidence and calculate speed, drag, and impact forces for different accident types.*
6. *Evaluate and recommend mitigation measures such as forgiving road design, road signs, public transport safety strategies, and road safety law enforcement.*

UNIT – I

Basics of Road Safety: Road accidents, Trends, Global and Indian level, Crash Causation, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India.

UNIT – II

Statistical Interpretation and Analysis of Crash Data: Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Hot spot analysis, Case Studies

UNIT – III

Road Safety Management System: Multi-causal dynamic systems approach to safety; Crash Vs. Accident; Road safety improvement strategies; Elements of a road safety plan, Speed management, Safety data Needs; Intersection Safety, Safe vehicle design. Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies

UNIT – IV

Crash Reconstruction: Describe the basic information that can be obtained from the roadway surface, Basic physics related to crash reconstruction, speed for a various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.

UNIT – V

Mitigation Measures: Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation, and accident control measures, Highway Safety Measures during construction, Highway geometry, and safety; Design of Forgiving roads and self-explaining roads, Effective Road Signs and Street Lighting, Safety in urban areas; Public transport and safety; Road safety policy-making, Stakeholders involvement; Road safety law.

TEXT BOOKS

1. M. Ohidul Haque, *Road Safety: Data Collection, Analysis, Monitoring, And Countermeasure Evaluations with Cases*, University Press of America, 2008.
2. Ezra Hauer, *Observational Before-After Studies in Road Safety*, Pergamon Press, 1997 (Reprinted 2002).

REFERENCES

1. IRC: SP: 88-2019 Manual on Road Safety Audit.
2. Geetam Tiwari and Dinesh Mohan, *Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer*, CRC Press, 1st edition, 2016.
3. Rune Elvik, Alena Hoye, and Truls Vaa, *The Handbook of Road Safety Measures, Emerald Group Publishing*, 2nd edition, Sept 2009.
4. R. P. Roess, E. S. Prassa, and W. R. Mcshane, *Traffic Engineering*, Prentice Hall, 5th edition, 2019.

ONLINE LEARNING RESOURCES

https://ebrdelearning.com/road-safety-engineering-e-learning-course

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B.Tech-CE

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(AUTONOMOUS)

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(23CE0165) NDT LAB

COURSE OBJECTIVES

The objective of this course is to

1. *Understand the fundamental principles and significance of non-destructive testing (NDT) in concrete structures*
2. *Apply various NDT techniques to evaluate the structural integrity and quality of concrete.*
3. *Analyze data from NDT methods to detect cracks, voids, rebar position, corrosion, and other defects.*
4. *Evaluate the durability and in-situ strength characteristics of concrete using advanced testing techniques.*
5. *Develop competence in interpreting NDT results for effective decision-making in structural health monitoring.*

COURSE OUTCOMES (COs)

At the end of the course, the student will be able to:

1. *Estimate the quality of structural components by using Rebound hammer and Ultrasonic pulse velocity tests.*
2. *Assess the hardened concrete's compressive strength by utilizing the Penetration Resistance test.*
3. *Conduct Half-Cell potential & Carbonation depth experiments to assess corrosion risk and depth of it.*
4. *Utilize rebar locator and ground penetrating radar to trace the cover, reinforcement plan and sub-surface imperfections.*
5. *Perform acoustic emission, visual and microscopic evaluations to evaluate the quality of concrete.*
6. *Analyze the defects in concrete by utilizing advanced techniques such as Impact echo test, optical fibers and Dye penetration tests.*

LIST OF EXPERIMENTS

1. To assess the surface hardness and compressive strength of concrete by using Rebound Hammer Test
2. To determine the quality, uniformity, and presence of cracks or voids in concrete by Ultrasonic Pulse Velocity Test
3. To evaluate the compressive strength of hardened concrete using probe penetration by Penetration Resistance Test

4. To measure the depth of carbonation in concrete this leads to corrosion of reinforcement by Carbonation Depth Test
5. To assess the corrosion potential of reinforcing steel in concrete by Half-Cell Potential Test
6. To detect reinforcement position, diameter, and concrete cover over rebars by Rebar Locator
7. To detect subsurface features, rebar locations, and voids in concrete structures by Ground Penetrating Radar
8. To monitor crack propagation and damage activity in structural components by Acoustic Emission Technique
9. To extract cores for testing and conduct visual and microscopic analysis of concrete quality.
10. To evaluate thickness, delaminations, and voids in concrete slabs or pavements by Impact Echo Test
11. To measure strain, temperature, or crack growth in structural components using embedded optical fibers.
12. To identify surface-breaking defects in non-porous materials by Dye Penetrant Testing

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(23CE0166) ETABS/SAP LAB

COURSE OBJECTIVES

The objectives of this course is to

1. U*nderstand the interface, tools, and modelling environment of ETABS and SAP2000 for structural design.*
2. *Develop and analyse multi-storey buildings, shear walls, and frames under various loads using ETABS and SAP2000.*
3. *Perform structural modelling, assign loads, and interpret analysis results for real world building and infrastructure systems.*
4. *Evaluate performance-based seismic behaviour and nonlinear analysis techniques using advanced structural software.*
5. *Design and optimize structural components like water tanks and bridges using advanced modelling tools.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Apply the ETABS and SAP2000 interface for modelling structural systems*
2. *Analyze the behaviour of multi-story buildings under lateral loads using ETABS*
3. *Analyze shear wall systems using ETABS for structural stability*
4. *Apply performance based seismic analysis methods in ETABS*
5. *Perform structural analysis of simple frames using SAP2000*
6. *Design and analysis of bridge models, elevated water tanks and apply of Nonlinear analysis for structural systems using SAP2000*

LIST OF EXPERIMENTS

1. Determination of ETABS Interface and Structural Modelling Techniques
2. Analysis of a Multi-Story Building under Lateral Loads in ETABS
3. Development of Structural Analysis for a Shear Wall System in ETABS
4. Application of Performance-Based Seismic Analysis in ETABS
5. Determination of Structural Analysis of a Simple Frame using SAP2000
6. Development of a Bridge Model and Load Analysis in SAP2000
7. Analysis and Design of an Elevated Water Tank using SAP2000
8. Application of Nonlinear Analysis for a Structural System using SAP2000

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III B.Tech – I Sem.

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(23CE0150) GREEN BUILDINGS
(Open Elective - I)

COURSE OBJECTIVES

The objectives of this course is to

1. *To understand the fundamental concepts of green buildings, their necessity, and sustainable features.*
2. *To analyse 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 modelling 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 this course, students will be able to:

1. *Choose appropriate materials and techniques for achieving the goal of green buildings during their design.*
2. *Analyze market opportunities, resources, different practices of green buildings and its effects on environment*
3. *Evaluate energy efficiency in design of green buildings*
4. *Design effective and eco-friendly green buildings*
5. *Apply natural air conditioning and lighting techniques in design of green buildings*
6. *Conserve materials, water and maintain quality of environment in construction of green buildings*

UNIT – I

Introduction to Green buildings: 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 Modelling, 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. Indian Society of Heating Refrigerating and Air conditioning Engineers, *Handbook on Green Practice*, 2025
2. Tom Woolley and Sam Kimings, *Green Building Hand Book*, 2009

REFERENCES

1. Trish riley, *Complete Guide to Green Buildings*
2. Kent Peterson, *Standard for the design for High Performance Green Buildings*, 2009
3. Energy Conservation Building Code –ECBC, BEE published, 2020
4. Dr.G.Prabhakaran, *Green Buildings and Eco-Engineering*, Vinsa Publishing, 1st edition, 2025

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III B.Tech – I Sem.

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(23CE0151) CONSTRUCTION TECHNOLOGY AND MANAGEMENT
(Open Elective – I)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand project management fundamentals, organizational structures, and leadership principles in construction.*
2. *Analyse 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.*

COURSE OUTCOMES (COs)

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

1. *Realize objectives, functions, public relations and management structure in projects*
2. *Plan and care the human resource needed for the project and can fix the rent of the construction equipment and can perform benefit cost analysis.*
3. *Apply different techniques in scheduling of projects.*
4. *Formulate CPM/PERT networks to evaluate the project completion time and also monitor the project during its life cycle.*
5. *Draft a contract document by incorporating various clauses as per Indian Contract act.*
6. *Implement safety measures to reduce construction related accidents*

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 - Work; 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. SK. Sears, GA. Sears and RH. Cloug, *Construction Project Management*, John Wiley and Sons, 6th edition, 2016.
2. Saleh Mubarak, *Construction Project Scheduling and Control*, 4th edition, 2019

REFERENCES

1. Brien, J.O. and Plotnick, F.L., *CPM in Construction Management*, McGraw Hill, 2015.
2. Punmia, B.C., and Khandelwal, K.K., *Project Planning and control with PERT and CPM*, Laxmi Publications, 2023.
3. Stephens Nunnally, *Construction Methods and Management*, Pearson New International, 8th Edition, Pearson, 2010
4. Rhoden, M and Cato B, *Construction Management and Organizational Behaviour*, Wiley-Blackwell, 2016.

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III B.Tech – II Sem.

L	T	P	C
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(23CE0152) DISASTER MANAGEMENT
(Open Elective – II)

COURSE OBJECTIVES

The objectives of this course is 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-resisting 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.*

COURSE OUTCOMES (COs)

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

1. *Examine types and patterns of natural disasters, interpret hazard maps, and evaluate disaster risk reduction and recovery measures.*
2. *Analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.*
3. *Apply wind engineering principles in the design of wind–resistant structures.*
4. *Apply computational techniques for the analysis and design of wind–resistant structures.*
5. *Evaluate earthquake effects on buildings and develop strategies for seismic retrofitting.*
6. *Design disaster-resistant structures with innovative construction materials.*

UNIT – I

Introduction to Natural Disasters: Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters in Different Climatic and Geographical Regions, Hazard Maps (Earthquake and Cyclone) of The World and India, Regulations for Disaster Risk Reduction, Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT – II

Cyclones and their Impact: 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. Behaviour 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: Wind Engineering and Structural Response– Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and 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 Features in 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 Coastal Areas

UNIT – IV

Seismology and Earthquake Effects: Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicentre, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides - Performance of Ground and Buildings in Past Earthquakes– Behaviour of Various Types of Buildings and Structures, Collapse Patterns; Behaviour of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies - Seismic Retrofitting– Weakness in Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.

UNIT – V

Planning and Design Considerations for Seismic Safety: 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*, CRC Press, 1st edition, 2017.
2. Edward A. Keller and Duane E. DeVecchio, *Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes*, Routledge, 5th edition, 2019.

REFERENCES

1. Ben Wisner, J.C. Gaillard, and IIan Kelman (Editors), *Handbook of Hazards and Disaster Risk Reduction and Management*, Routledge, 2nd edition, 2012.
2. Damon P. Coppola, *Introduction to International Disaster Management*, Butterworth-Heinemann, 4th edition, 2020.
3. Bimal Kanti Paul, *Environmental Hazards and Disasters: Contexts, Perspectives and Management*, Wiley-Blackwell, 2nd edition, 2020.

ONLINE LEARNING RESOURCES

https://nptel.ac.in/courses/124107010

https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

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B.Tech-CE

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III B.Tech – II Sem.

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(23CE0153) SUSTAINABILITY IN ENGINEERING PRACTICES
(Open Elective – II)

COURSE OBJECTIVES

The objectives of this course is 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.*

COURSE OUTCOMES (COs)

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

1. *Recognize the rule of construction materials in contributing to CO_2 emissions from materials*
2. *Choose construction materials that are more sustainable.*
3. *Calculate the embodied energy of various construction materials and assess their contribution to overall building energy consumption.*
4. *Differentiate between embodied and operational energy in buildings and evaluate total life cycle energy use for sustainable construction.*
5. *Implement energy efficiency standards, and rating systems such as LEED, GRIHA, and ECBC, including the role of materials, insulation, and thermal performance in sustainable building design*
6. *Analyze the environmental impacts of non-renewable energy sources, including their role in global warming, greenhouse effects, acid rain, and regional climate changes.*

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-V is Operational Energy in Conditioned Building - Life Cycle Energy Use

UNIT – IV

Green Buildings: Control of Energy use in Building - ECBC Code, Codes in Neighbouring 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 Modelling - 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, Global Warming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.

TEXT BOOKS

1. Charles J Kibert, *Sustainable Construction: Green Building Design & Delivery*, Wiley Publishers, 5th edition, 2022.
2. Steve Goodhew, *Sustainable Construction Process*, Wiley Blackwell, UK, 2020.

REFERENCES

1. Craig A. Langston & Grace K.C. Ding, *Sustainable Practices in the Built Environment*, Butterworth Heinemann Publishers, 2014.
2. William P Spence, *Construction Materials, Methods & Techniques*, Yesdee Publication Pvt. Ltd, 3rd edition, 2019.

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IV B.Tech – I Sem.

L	T	P	C
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(23CE0154) BUILDING MATERIALS AND SERVICES
(Open Elective – III)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminium, glass, paints, and plastics.*
2. *Analyze the composition, manufacturing process, and properties of cement and admixtures.*
3. *Apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.*
4. *Evaluate masonry, mortars, finishing techniques, and formwork systems.*
5. *Assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection.*

COURSE OUTCOMES (COs)

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

1. *Identify and classify construction materials and select materials appropriately for construction use*
2. *Analyze physical and laboratory test of cement and select appropriate admixtures based on desired performances*
3. *Identify and describe the functions, types, and structural aspects of essential building components such as lintels, arches, walls, vaults, staircases, floors, and roofs.*
4. *Apply appropriate materials and construction techniques in the design of building components including joinery ,doors and windows and foundations, considering functional and structural requirements*
5. *Design temporary supporting systems including formwork, scaffolding, shoring, and underpinning as per site conditions and structural needs*
6. *Apply principles of acoustics to evaluate sound absorption and develop suitable acoustic design solutions for different building types*

UNIT – I

Stones and Bricks, Tiles: Building Stones - Classifications and Quarrying - Properties - Structural Requirements - Dressing. Bricks - Composition of Brick Earth - Manufacture and Structural Requirements, Fly Ash, Ceramics. Timber, Aluminium, Glass, Paints and Plastics: Wood - Structure - Types and Properties - Seasoning - Defects; Alternate Materials for Timber - GI / Fiber - Reinforced Glass Bricks, Steel & Aluminium, Plastics.

UNIT – II

Cement & Admixtures: Types of Cement - Ingredients of Cement - Manufacture - Chemical Composition - Hydration - Field & Lab Tests - Fineness - Consistency - Initial &Final Setting - Soundness . Admixtures - Mineral & Chemical Admixtures - Uses

UNIT – III

Building Components: Lintels, Arches, Walls, Vaults - Stair Cases - Types of Floors, Types of Roofs - Flat, Curved, Trussed; Foundations - Types; Damp Proof Course; Joinery - Doors - Windows - Materials - Types.

UNIT – IV

Mortars, Masonry and Finishing's Mortars: Lime and Cement Mortars Brick Masonry - Types - Bonds; Stone Masonry - Types; Composite Masonry - Brick-Stone Composite; Concrete, Reinforced Brick. Finishers: Plastering, Pointing, Painting, Claddings - Types - Tiles - ACP form Work: Types: Requirements - Standards - Scaffolding - Design; Shoring, Underpinning.

UNIT – V

Building Services: Plumbing Services: Water Distribution, Sanitary - Lines &Fittings; Ventilations: Functional Requirements Systems of Ventilations. Air-Conditioning - Essentials and Types; Acoustics - Characteristic - Absorption - Acoustic Design; Fire Protection - Fire Hazards - Classification of Fire Resistant Materials and Constructions

TEXT BOOKS

1. Arora & Bindra, *Building Materials and Construction*, Dhanpat Roy Publications, 4th edition, 2010.
2. G C Sahu, Joygopal Jena, *Building Materials and Construction*, McGraw Hill Pvt Ltd, 2nd edition, 2022.

REFERENCES

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Building Construction*, Laxmi Publications (P) Ltd., New Delhi, 12th edition, 2022
2. P. C. Varghese, *Building Materials*, Prentice Hall of India, 2020.
3. N.Subramanian, *Building Materials Testing and Sustainability*, Oxford Higher Education, 2021.
4. R. Chudley, *Construction Technology*, Longman Publishing Group, 5th edition, 2011.
5. S. K. Duggal, *Building Materials*, Oxford & IBH Publishing Co. Ltd., New Delhi, 2022

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(23CE0155) ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective – III)

COURSE OBJECTIVES

The objectives of this course is to

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 this course, students will be able to:

1. *Evaluate different EIA methods and use cost/benefit analysis to help in project decision-making.*
2. *Identify the impacts of developmental activities on land, water, air, and biological environment, and suggest suitable mitigation measures.*
3. *Understand the impacts of developmental activities and deforestation on vegetation and wildlife.*
4. *Apply the principles of environmental risk assessment to identify potential risks and suggest appropriate mitigation strategies.*
5. *Apply environmental audit procedures and analyse audit data to prepare a report in accordance with environmental regulations.*
6. *Analyze environmental rules, EIA steps, and ISO 14000 to understand how they help in pollution control and reporting.*

UNIT – I

Concepts and Methodologies of EIA: Initial Environmental Examination, Elements of EIA, - Factors Affecting EIA, Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters - Criteria for the Selection of EIA Methodology, EIA 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 Activities. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures

EIA 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. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies*, B.S.Publications, Hyderabad, 3rd edition, 2021
2. N.S. Raman, A.R.Gajbhiye, S.R.Khandeshwar, *Environmental Impact Assessment*, TechSar Pvt. Ltd., 2nd edition, 2014

REFERENCES

1. K. Suresh Dhaneja, *Environmental Science and Engineering*, S.K., Katania & Sons Publication, New Delhi, 2011

2. V.S. Kulkarni, S.N. Kaul & R.K. Trivedy, *A Handbook of Environment Impact Assessment*, Scientific Publishers, 2024
3. H. S. Peavy, Rowe, D. R, Tchobanoglous,G, *Environmental Engineering*, McGraw Hill International Editions, New York, 7th edition, 2017

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IV B.Tech – I Sem.

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(23CE0156) GEO-SPATIAL TECHNOLOGIES
(Open Elective – IV)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand raster-based spatial analysis techniques, including query, overlay, and cost-distance analysis.*
2. *Analyse vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.*
3. *Apply network analysis techniques for geocoding, shortest path analysis, and location-allocation problems.*
4. *Evaluate surface and geostatistical analysis methods, including terrain modelling, watershed analysis, and spatial interpolation.*
5. *Assess GIS customization, Web GIS, and mobile mapping techniques for real world applications.*

COURSE OUTCOMES (COs)

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

1. *Apply raster-based spatial operations such as map algebra, reclassification, and cost-distance analysis to solve basic spatial problems.*
2. *Find and explain spatial relationships in vector data using overlay and buffer tools.*
3. *Construct and evaluate network models to determine optimal paths, service areas, and facility locations using time and distance constraints.*
4. *Work with network data to find shortest routes, service areas, and best locations for facilities.*
5. *Understand and explain terrain features and data patterns using elevation and interpolation methods*
6. *Assess the role of customization, Web GIS, and location-based services in developing efficient and user-specific GIS applications using scripting and big data tools.*

UNIT – I

Raster Analysis: Raster Data Exploration - Query Analysis - Local Operations - Map Algebra, Reclassification, Logical and Arithmetic Overlay Operations - Neighbourhood - Operations - Aggregation, Filtering - Extended Neighbourhood - Operations - Zonal Operations - Statistical Analysis - Cost-Distance Analysis - Least Cost Path.

UNIT – II

Vector Analysis: Non-Topological Analysis - Attribute Database Query, Structured Query Language, Co-Ordinate Transformation, Summary Statistics, Calculation of Area, Perimeter and

Distance - Topological Analysis - Reclassification, Aggregation, Overlay Analysis: Point-In-Polygon, Line-In-Polygon, Polygon-On-Polygon - Clip, Erase, Identity, Union, Intersection - Proximity Analysis - Buffering

UNIT – III

Network Analysis: Network - Introduction - Network Data Model - Elements of Network - Building A Network Database - Geocoding - Address Matching - Shortest Path in A Network - Time and Distance Based Shortest Path Analysis - Driving Directions - Closest Facility Analysis - Catchment / Service Area Analysis – Location - Allocation Analysis

UNIT – IV

Surface and Geostatistical Analysis: Surface Data - Sources of X, Y, Z Data - DEM, TIN - Terrain Analysis - Slope, Aspect, View shed, Watershed Analysis: Watershed Boundary, Flow Direction, Flow Accumulation, Drainage Network, Spatial Interpolation: IDW, Spline, Kriging, Variogram

UNIT – V

Customisation, Web GIS, Mobile Mapping: Customisation of GIS: Need, Uses, Scripting Languages - Embedded Scripts - Use of Python Script - Web GIS: Web GIS Architecture, Advantages of Web GIS, Web Applications - Location Based Services: Emergency and Business Solutions - Big Data Analytics.

TEXT BOOKS

1. Kang – Tsung Chang, *Introduction to Geographical Information System*, Tata McGraw Hill, 9th edition, 2019
2. Lo, C.P. and Yeung, Albert K.W., *Concepts and Techniques of Geographic Information Systems*, Prentice Hall, 3rd edition, 2007

REFERENCES

1. Michael N. Demers, *Fundamentals of Geographic Information Systems*, John Wiley & sons publishers, 4th edition, 2009
2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasaraju, *An Introduction to Geographical Information Systems*, Pearson Education, 4th edition, 2012
3. John Peter Wilson, *The Handbook of Geographic Information Science*, Blackwell Publishing Ltd, 1st edition, 2008.

ONLINE LEARNING RESOURCES

https:/onlinecourses.nptel.ac.in/noc19_cs76/preview
https://archive.nptel.ac.in/courses/105/105/105105202/

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)

IV B.Tech – I Sem.

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(23CE0157) SOLID WASTE MANAGEMENT
(Open Elective – IV)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.*
2. *Analyse engineering systems for solid waste collection, storage, and transportation.*
3. *Apply resource and energy recovery techniques for sustainable solid waste management.*
4. *Evaluate landfill design, construction, and environmental impact mitigation strategies*
5. *Assess hazardous waste management techniques, including biomedical and e-waste disposal.*

COURSE OUTCOMES

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

1. *Categorize and can perform sampling of solid waste*
2. *Plan for solid waste management for collection, storage and processing*
3. *Device system for biological conversion of solid waste into useful end products.*
4. *Device system for thermal conversion of solid waste into useful end products.*
5. *Design system for landfilling of solid waste*
6. *Effectively plan for various categories of solid waste such as biomedical waste, E-waste, nuclear waste, industrial waste management*

UNIT – I

Solid Waste: Definitions - Types of Solid Wastes - Sources of Solid Wastes - Characteristics and Perspectives - Properties of Solid Wastes - Sampling of Solid Wastes - Elements of Solid Waste Management - Integrated Solid Waste Management - Solid Waste Management Rules 2016.

UNIT – II

Engineering Systems for Solid Waste Management: Solid Waste Generation - On-Site Handling - Storage and Processing - Collection of Solid Wastes - Stationary Container System and Hauled Container Systems - Route Planning - Transfer and Transport - Processing Techniques

UNIT – III

Engineering Systems for Resource and Energy Recovery: Processing Techniques - Materials Recovery Systems - Recovery of Biological Conversion Products - Composting - Pre and Post Processing - Types of Composting - Critical Parameters - Problems with Composing - Recovery

of Thermal Conversion Products - Pyrolysis - Gasification - RDF - Recovery of Energy From Conversion Products - Materials and Energy Recovery Systems

UNIT – IV

Landfills: Evolution of Landfills - Types and Construction of Landfills - Design Considerations - Life of Landfills - Landfill Problems - Lining of Landfills - Types of Liners - Leachate Pollution and Control - Monitoring Landfills - Landfills Reclamation

UNIT – V

Hazardous Waste Management: Sources and Characteristics - Effects on Environment - Risk Assessment - Disposal of Hazardous Wastes - Secured Landfills - Incineration - Monitoring - Biomedical Waste Disposal - E-Waste Management - Nuclear Wastes - Industrial Waste Management

TEXT BOOKS

1. Tchobanoglous G, Theisen H and Vigil SA, *Integrated Solid Waste Management, Engineering Principles and Management Issues,* McGraw Hill, 2014.
2. Vesilind PA, Worrell W and Reinhart D, *Solid Waste Engineering,* Brooks/Cole Thomson Learning Inc., 2002.

REFERENCES

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, *Environmental Engineering*, McGraw Hill Inc., New York, 1985.
2. Qian X, Koerner RM and Gray DH, *Geotechnical Aspects of Landfill Design and Construction,* Prentice Hall, 2002.