DEPARTMENT OF

CIVIL ENGINEERING

VISION OF THE DEPARTMENT

To develop Civil Engineering Department as a Centre of excellence for imparting value based education to the students at undergraduate and post-graduate level to meet industry needs and to develop as a major research center meeting national and international standards.

MISSION OF THE DEPARTMENT

➢ To impart in-depth and up-to-date knowledge of Civil Engineering concepts with focus on character enhancement, leadership qualities, effective communication, social responsibility and pursuit of lifelong learning and professional development.

➢ To provide a platform to the students to engage in original innovative research.

B.TECH.
(CIVIL ENGINEERING)

B.TECH. (CE)

PROGRAM EDUCATIONAL OBJECTIVES

PEO-I: To provide students with a solid foundation in Basic and Engineering Sciences to understand, analyze and evaluate the information to achieve expertise in core areas of Civil Engineering.

PEO-II: To prepare the students to achieve high level technical expertise in the fields of Civil Engineering and to excel in the design and construction of various components or systems of Civil Engineering and to make the students capable of pursuing higher studies and research.

PEO-III: To establish acquaintance with the practical implementation of the theoretical concepts through laboratories, by bringing the real world into the academics through virtual industry labs and to enhance experimental skills of students beyond curriculum and encouraging them to identify and solve complex engineering problems.

PEO-IV: To equip students with modern professional abilities such as effective communication, collaborative work in diverse teams, ethical decision making, successful management of personal and professional career objectives and passion for continuous development through lifelong learning.

PEO-V: V. To prepare the students to guide their professional development by bringing awareness of professional society activities, professional licensure requirements and opportunities for further education in graduate school

B.TECH. (CE)

PROGRAM OUTCOMES

PO-1: **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2: **Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4: **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including

prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO-7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities, and norms of the engineering practice

PO-9: Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-Long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning (LLL) in the broadest context of technological change.

B.TECH. (CE)

PROGRAM SPECIFIC OUTCOMES

PSO-1: Survey, Plot & Plan layout for Civil Engineering Structures and alignment for Canals & Roads.

PSO-2: Analyze the problems related to structural components for Buildings, Pavements and Waterways and recommend suitable measures with appropriate consideration for public health, safety and Environmental sustainability.

PSO-3: Specify, design, supervise, test & evaluate foundations & superstructures for Buildings, Industries. Hydraulic structures, Powerhouses, Highways, Railways, Airways, Water supply systems & Sewage treatment plants.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. I YEAR
CIVIL ENGINEERING

I SEMESTER   **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT101	Matrices and Calculus	3	1	0	4	4
22BS1PH101	Engineering Physics	3	0	0	3	3
22ES1CS103	C Programming and Data Structures	3	0	0	3	3
22HS1EN101	English for Skill Enhancement	2	0	0	2	2
22PC1CE101	Civil Engineering Materials	2	0	0	2	2
22ES2CS103	C Programming and Data Structures Laboratory	0	0	2	2	1
22HS2EN101	English Language and Communication Skills Laboratory	0	0	2	2	1
22ES2ME101	Engineering Workshop	1	0	2	3	2
22BS2PH101	Engineering Physics laboratory	0	0	2	2	1
22SD5CE101	Elements of Civil Engineering	0	0	2	2	1
22MN6HS101	Induction Programme	2	0	0	2	0
Total		**16**	**1**	**10**	**27**	**20**

II SEMESTER   **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT102	Ordinary Differential Equations and Vector Calculus	2	1	0	3	3
22BS1CH101	Engineering Chemistry	3	0	0	3	3
22ES1CE101	Applied Mechanics	2	1	0	3	3
22PC1CE102	Surveying	3	0	0	3	3
22PC1CE103	Building Construction and Planning	2	0	0	2	2
22ES3CE101	Computer Aided Engineering Graphics	0	0	6	6	3
22PC2CE102	Surveying Laboratory	0	0	2	2	1
22ES2DS101	Python Programming Laboratory	0	0	2	2	1
22BS2CH101	Engineering Chemistry Laboratory	0	0	2	2	1
22MN6HS102	Environmental Science	2	0	0	2	0
Total		**14**	**2**	**12**	**28**	**20**

L – Lecture   T – Tutorial   P – Practical   D – Drawing   CH – Contact Hours/Week
C – Credits   SE – Sessional Examination   CA – Class Assessment   ELA – Experiential Learning Assessment
SEE – Semester End Examination   D-D – Day to Day Evaluation   LR – Lab Record
CP – Course Project   PE – Practical Examination

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22BS1MT101) MATRICES AND CALCULUS

TEACHING SCHEME		
L	T/P	C
3	1	4

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Matrices, Differentiation, Integration

COURSE OBJECTIVES:
- To know the rank of the matrix and its application to consistency of system of linear equations
- To know Eigen values and Eigen vectors
- To know the nature of Quadratic forms
- To know maximum and minimum of a given function with several variables
- To evaluate multiple integrals and their applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Compute the rank of a matrix and analyze the solution of a system of linear equations
CO-2: Calculate Eigen values and Eigen vectors
CO-3: Reduce the quadratic form to its canonical form
CO-4: Solve problems involving Maxima and Minima
CO-5: Evaluate multiple integrals and its applications in areas and volumes

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2		-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

UNIT-I:
Matrices: Types of real matrices, symmetric, skew symmetric and orthogonal matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Consistency of Homogeneous and Non-Homogeneous equations, LU Decomposition method.

UNIT-II:

Eigen Values and Eigen Vectors: Eigen values and eigenvectors and their properties, Diagonalization of matrices; Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem

UNIT-III:
Complex Matrices and Quadratic Forms: Types of complex matrices; Hermitian; Skew-Hermitian, Unitary Matrices and its properties; Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical form using Linear Transformation and Orthogonal Transformation.

UNIT-IV:
Functions of Several Variables: Definitions of Limits, Continuity. Partial differentiation: partial derivatives of first and second order, Euler's theorem, Total derivative, Jacobian, Functional dependence, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

UNIT-V:
Multiple Integrals with Applications: Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form), Change of variables (Cartesian to polar). Evaluation of Triple integrals, Change of variables (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS:
1. Higher Engineering Mathematics, B. V. Ramana, 11th Reprint, Tata McGraw-Hill, 2010
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publications
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley India Pvt. Ltd.

REFERENCES:
1. Linear Algebra and its Applications, Gilbert Strang, Cengage Publication
2. Matrices, A. R. Vasishtha and A. K. Vasishtha, Krishna's Educational Publishers
3. Engineering Mathematics, N. P. Bali, 4th Edition, Laxmi Publications (P) Ltd.
4. Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, 9th Edition, Pearson, 2002
5. Linear Algebra and its Applications, David C. Lay, Pearson Education India, 2003

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22BS1PH101) ENGINEERING PHYSICS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: 10+2 Physics

COURSE OBJECTIVES:
- To apply the principles of lasers for various laser systems and optical fibers
- To understand basic crystal structures, XRD and defects in solids
- To explore the concepts related to the dielectric materials
- To study the fundamental concepts related to the magnetic materials and superconductors
- To identify the importance of energy materials and nanomaterials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain various aspects of lasers, optical fiber and their applications in diverse fields
CO-2: Identify different types of crystals, importance of X-ray studies in crystals and realize the importance of crystal defects
CO-3: Illustrate applications of dielectric materials
CO-4: Realize the applications of magnetic and superconducting materials
CO-5: Explore the features and applications of energy materials and nanomaterials

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	1	-	1	1	-	1	1		1	-	-
CO-2	3	2	2	1	2	1	-	-	1	1		1	-	-
CO-3	3	2	2	1	-	2	-	-	1	1		1	-	-
CO-4	3	2	1	1	-	1	-	-	1	1		1	-	-
CO-5	3	2	2	1	1	2	2	-	1	1		1	-	-

UNIT-I:
Laser and Fiber Optics:
Lasers: Laser beam characteristics-Three quantum processes (Absorption, Spontaneous emission & Stimulated emission), Lifetime, Metastable state, Population inversion, Pumping methods- Lasing action -Block diagram of laser-Einstein coefficients and their relations, Ruby laser, He-Ne laser, Applications of laser.
Fiber Optics: Introduction to optical fiber- Advantages of optical fibers - Total internal reflection, Construction of optical fiber - Acceptance angle - Numerical aperture- Classification of optical fibers. fiber optic laser - Applications.

UNIT-II:
Crystallography and Defects in Solids: Space lattice, Unit cell, Lattice parameters, Crystal systems, Bravais lattice, Atomic radius, Co-ordination number, Structures and Packing fractions of Simple Cubic, Body Centered Cubic, Face Centered Cubic, Miller Indices for Crystal planes and directions, Inter planar spacing of orthogonal crystal systems, Diffraction of X-rays by crystal planes and Bragg's law, Powder method, Applications of XRD.
Point defects (Vacancies, Interstitial and Impurities) Line imperfections, Edge and Screw dislocation, Burger vector, Surface defects and volume defects (Qualitative Treatment).

UNIT-III:
Dielectric Properties: Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic polarizations and calculation of theirs polarizabilities, Orientation Polarization (qualitative), Frequency dependence of Polarization- Internal fields, Claussius – Mossotti equation, Piezo and Ferro electricity.

UNIT-IV:
Magnetic Materials and Superconductors: Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility – Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications, Superconductivity phenomenon, Meissner effect, Type I and Type II superconductors, Applications of Superconductors.

UNIT-V:
Energy Materials and Nanotechnology:
Energy Materials: Introduction to energy materials, Electrolytes for super capacitors - Rechargeable ion batteries, Solid fuel cells.
Nanotechnology: Introduction, Quantum confinement, Surface to volume ratio, Physical properties, Bottom-up approach: Sol-gel, Top-down approach: Ball milling - Characterization techniques – Average crystallite size using X-ray diffraction pattern, Scanning electron microscopy - Applications of nanomaterials.

TEXT BOOKS:
1. A Text book of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arun Murthy, 11th Edition, S. Chand Publications, 2019
2. Engineering Physics, B. K. Pandey and S. Chaturvedi, 2nd Edition, Cengage Learning, 2022
3. Engineering Physics, P. K. Palanisamy, Scitech Publications

REFERENCES:
1. Essentials of Nanoscience & Nanotechnology, K. Narasimha Reddy, 1st Edition, Nano Digest, 2021
2. Fundamentals of Physics, Halliday, Resnick and Walker, 11th Edition, John Wiley & Sons, 2018
3. Introduction to Solid State Physics, A. C. Kittel, Wiley Eastern, 2019
4. Nano Materials, A. K. Bhandhopadhya, 1st Edition, New Age International, 2007
5. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage, A. S. Bandarenka, 1st Edition, CRC Press, Taylor & Francis, 2022

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES1CS103) C PROGRAMMING AND DATA STRUCTURES

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To introduce the basics of programming, computing environments
- To understand various C language constructs
- To explore operations and concepts of different data structures
- To know various file operations

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Illustrate algorithm, flow chart for a given problem
CO-2: Explore the basics of C and various data types in C
CO-3: Develop modular programs using different language constructs
CO-4: Analyse the basic concepts and different operations on Linear and Non-Linear Data structures
CO-5: Solve a given problem using C language

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	1	2	2	-	-	-	-	1	1	1	-	1	-	-	-
CO-2	3	2	3	1	2	-	-	-	1	-	-	2	-	-	-
CO-3	3	3	3	2	2	-	-	2	2	2	-	2	-	-	-
CO-4	3	3	2	2	-	-	-		2		-	2	-	-	-
CO-5	3	3	3	2	2	-	-	2	2	2	-	2	-	-	-

UNIT-I:
Algorithm: Flowchart- Structure of C program- Identifiers- Basic data types-Constants-variables- Operators-Expressions- Precedence and order of evaluation.
Input-Output Statements: If and switch statements- Loops- While- Do-while and for Statements- Break- Continue- Goto and Labels- Example C Programs.

UNIT-II:
Functions: basic concepts- parameter passing- storage classes- scope rules- user defined functions- standard library functions- recursive functions- example C programs.

UNIT-III:
Arrays: Basic concepts- one-dimensional and two-dimensional arrays- Character array- string handling functions- example C programs.
Sorting: Selection sort- Bubble sort- Insertion sort.
Searching-Linear and Binary search methods.

UNIT-IV:

Structures: Declaration-Definition and Initialization of Structures-Accessing Structures-Operations on Structures, typedef. Unions- Declaration-Definition and Initialization of Unions.

Pointers: Basic concepts- Pointers and functions- Pointers and strings- Pointers and arrays- Pointers and structures- Self referential structures, Dynamic Memory Allocation-Example C programs.

UNIT-V:

Introduction to Data Structures- Stacks and Queues(Linear, Circular, Dequeue)-ADT-Implementation Using Arrays.

Linked List: Definition, representation, ADT, List of applications, Trees - Definition, representation ADT, List of applications and Graphs - Definition, representation, ADT, List of applications

TEXT BOOKS:
1. Computer Science - A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Thomson
2. The C Programming Language, B. W. Kernighan, Dennis M. Ritchie, PHI/Pearson Education
3. C Programming and Data Structures, E. Balagurusamy, TMH

REFERENCES:
1. Data Structures Using C, A. S. Tanenbaum, Y. Langsam and M. J. Augenstein, PHI/ Pearson Education
2. Programming in C, Stephen G. Kochan, 3rd Edition, Pearson Education
3. Data Structures and Program Design in C, R. Kruse, C. L. Tondo, B. P. Leung, Shashi M, 2nd Edition, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22HS1EN101) ENGLISH FOR SKILL ENHANCEMENT

TEACHING SCHEME		
L	T/P	C
2	0	2

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To enhance vocabulary through word formation processes
- To read and comprehend different kinds of texts (tone, tenor, sound, sense, diction, etc. - sub-skills)
- To write clear, concise, and correct sentences and paragraphs to produce appropriate technical prose
- To improve coherence and cohesion in writing and speaking
- To recognize and practice the use of rhetorical elements necessary for the successful practice of scientific and technical communication

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use vocabulary contextually and effectively
CO-2: Employ reading skills to comprehend different kinds of texts. (tone, tenor, sound, sense, diction, etc.
CO-3: Apply principles of critical thinking and problem-solving for clarity, conciseness and accuracy of expression in academic and professional communication
CO-4: Demonstrate improved competence in Standard Written English, including grammar, sentence and paragraph structure and coherence, and use this knowledge to accurately communicate technical information
CO-5: Employ appropriate rhetorical patterns of discourse in scientific and technical communication

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	1	1	1	1	-	2	1	1	2	3	2	2	-	-
CO-2	2	2	2	2	2	2	2	1	3	3	2	2	-	-
CO-3	2	2	2	2	1	3	2	1	3	3	2	2	-	-
CO-4	1	1	1	1	1	2	2	1	2	3	2	2	-	-
CO-5	1	1	1	1	-	2	1	1	2	2	1	1	-	-

UNIT-I:
1. Reading: On the Conduct of Life by William Hazlitt
2. Grammar: Conjunctions and Prepositions
3. Vocabulary: Word Formation (Affixation, Compounding, Conversion, Blending, Borrowing)
4. Writing: Punctuation, Clauses and Sentences Transitional Devices- Paragraph Writing- Process

UNIT-II:
1. Reading: How I Became a Public Speaker by G.B. Shaw
2. Grammar: Articles, Noun-Pronoun Agreement, Concord
3. Vocabulary: Word Formation- (Prefixes, Suffixes, Root Words)
4. Writing Skills: Principles of Good Writing-Coherence, Cohesion Essay Writing - Descriptive, Argumentative, Expository

UNIT-III:
1. Reading: Muhammad Yunus
2. Grammar: Misplaced Modifiers
3. Vocabulary: Synonyms and Antonyms
4. Writing Skills: Letter Writing- Formal Letters - Letter of Complaint, Letter of Requisition, Email Writing; Email Etiquette

UNIT-IV:
1. Reading: Politics and the English Language by George Orwell
2. Grammar: Cliches, Redundancies
3. Vocabulary: Common Abbreviations
4. Writing Skills: Summary Writing; Job Application; Resume

UNIT-V:
Organizational Patterns for writing
1. Patterns of Writing: Comparison and Contrast Pattern
2. Patterns of Writing: Cause and Effect Pattern
3. Patterns of Writing: Classification Pattern
4. Patterns of Writing: Problem-Solution Pattern

TEXT BOOKS:
1. Language and Life: A Skills Approach, Orient Black Swan
2. Technical Communication Rebecca E. Burnett, 6th Edition, Cengage Learning

REFERENCES:
1. Communication Skills, Pushplata and Kumar, Sanjay, OU Press, 2015
2. Remedial English Grammar, Wood F. T., Macmillan, 2007
3. Study Writing, Hamp, Liz., Lyons and Heasly, Ben, C U Press, 2006
4. Practical English Usage, Swan, Michael, OU Press, 1995
5. Longman Dictionary of Common Errors, Turton N. D. and Heaton J. B., 1991

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22PC1CE101) CIVIL ENGINEERING MATERIALS

TEACHING SCHEME		
L	T/P	C
2	0	2

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Chemistry

COURSE OBJECTIVES:
- To discuss and understand the characteristics of different building materials
- To understand different applications of building materials in civil engineering
- To understand the different types of coating materials
- To know the modern civil engineering materials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Classify and characterize the building materials
CO-2: Comprehend various types and applications in civil Engineering construction
CO-3: List the tests on different building materials
CO-4: Identity the different modern civil engineering materials and their application in construction

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	-	2	-	-	1	1	-	-	-	-	-	1	1	1
CO-2	2	-	2	-	-	1	1	-	-	-	-	-	1	1	1
CO-3	2	-	2	-	-	1	1	-	-	-	-	-	1	1	1
CO-4	2	-	2	-	-	1	1	-	-	-	-	-	1	1	1

UNIT-I:
Stones: Stones – Classification and Quarrying – Properties – Structural requirements – Dressing of stones - Tests for stones - Common building stones of India.

UNIT-II:
Tiles and Bricks: Tiles - Types of tiles – Properties – Applications - Brick - Composition of Brick earth – Manufacturing and Properties of Bricks - Tests on Bricks - Classification of Bricks - Fly Ash Bricks – Cellular Light Weight Concrete (CLC) Bricks – Autoclaved Aerated Concrete (AAC) Bricks - Composition and Manufacturing – Applications.

UNIT-III:
Lime, Cement, Wood: Lime - Ingredients of lime – Classification – Manufacturing - Cement - Composition of Cement and their Functions - Wood – Structure – Types and Properties – Seasoning - Methods

UNIT-IV:

Steel and Glass: Steel – Composition - Properties of Mild Steel - Defects in Steel - Market forms of Steel - Mechanical treatment of Steel - Glass – Composition – Properties and Applications -Paints - Characteristics of an Ideal Paint- Types and Applications

UNIT-V:

Modern Materials for Construction: Asphalt – Bitumen – Gypsum - Heat Insulating Materials - Recycled Aggregates - Smart Materials - Composite Materials - Types and Applications

TEXT BOOKS:
1. Building Materials, S. K. Duggal, New Age International Publishers
2. Engineering Materials (Material Science), S. C. Rangwala, Charotar Publishing House

REFERENCES:
1. Building Materials Products, Properties and Systems, M. L. Gambhir, Neha Jamwal, Tata McGraw-Hill
2. Materials Science and Engineering - An Introduction, William D. Callister, Jr., John Wiley and Sons
3. Building Materials and Construction, Dr. Anil Kumar Misra, S. Chand Publishers

ONLINE RESOURCES:
1. https://nptel.ac.in/courses/105106206
2. https://nptel.ac.in/courses/105102088

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES2CS103) C PROGRAMMING AND DATA STRUCTURES LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To gain a working knowledge of C programming to write modular, efficient and readable C programs by Identifying the structural elements and layout of C source code
- To use different basic and derived data types
- To understand the concept of modular programming
- To identify various operations on data structures

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Use various data types and apply basic concepts of the language for a specified problem

CO-2: Choose appropriate language constructs to develop a solution for a given problem

CO-3: Execute the programs using modular approach

CO-4: Implement various operations of a given data structure

CO-5: Solve a given problem using C language

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO-2	2	2	2	1	-	-	-	-	-	-	-	2	-	-	-
CO-3	2	2	1	2	1	-	-	-	2	1	-	2	-	-	-
CO-4	2	2	1	2		-	-	-	2	1	-	2	-	-	-
CO-5	2	2	2	2	1	-	-	2	2	1	-	2	-	-	-

LIST OF PROGRAMS:

WEEK 1:
Small programs on input output statements
Small programs on various types of operators

WEEK 2:
Small but tricky codes on decision making statements(If, If-else, Nested If-Else, Else if Ladder, Switch.
Programs using loops (goto, while, do..while, for)
Programs to understand difference between Break and Continue

WEEK 3:
Programs on proper parameter passing techniques

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Programs to understand storage classes
Programs using recursion

WEEK 4:
Programs on I-D arrays
Programs on 2-D arrays

WEEK 5:
Programs on strings
Programs using string handling functions

WEEK 6:
Programs on searching and sorting

WEEK 7:
LAB INTERNAL-1

WEEK 8:
Programs using structures, Unions

WEEK 9:
Simple Programs using pointers

WEEK 10:
Programs using pointers on arrays, strings
Programs using pointers on structures

WEEK 11:
Program to implement stacks using arrays

WEEK 12:
Program to implement Linear queue using arrays

WEEK 13:
Program to implement Circular and Dequeue using arrays.

WEEK 14:
LAB INTERNAL-2

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22HS2EN101) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To train students to use neutral accent through phonetic sounds, symbols, stress and intonation
- To provide practice in vocabulary usage & grammatical construction
- To provide ample practice in LSRW skills and train the students in oral presentations, public speaking, role play, and situational dialogue
- To provide practice in defining technical terms and describing processes
- To equip students with excellent writing skills and information transfer skills

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Speak fluently with a neutral accent
CO-2: Use contextually apt vocabulary and sentence structures
CO-3: Make Presentations with great confidence
CO-4: Define technical terms and describe processes
CO-5: Write accurately, coherently, and lucidly

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	-	-	-	-	-	-	-	-	2	3	1	1	-	-
CO-2	1	1	1	1	3	1	1	1	2	3	1	1	-	-
CO-3	1	1	-	-	-	2	2	-	3	3	3	1	-	-
CO-4	2	2	2	2	-	2	2	-	2	3	1	1	-	-
CO-5	1	1	1	1	-	2	1	-	2	3	2	1	-	-

LIST OF EXERCISES:

1. Self-Introduction
2. Phonetics- Identifying sounds-Word stress- Intonation
3. Reading Comprehension – Reading for Gist & for Specific Details; Making inferences
4. Story Telling
5. Making Short Oral Presentations
6. Listening Comprehension- Listening for Global meaning & specific details; note taking
7. Learning vocabulary from context
8. Book Review
9. Writing Resume and CV
10. Information Transfer

11. Social Media Skills – Writing a Blog
12. Defining Technical Terms and Describing Processes

TEXT BOOKS:
1. Technical Communication, Rebecca E. Burnett, 6th Edition, Cengage Learning

REFERENCES:
1. Practical English Usage, Swan, Michael, Oxford University Press, 1995
2. Remedial English Grammar, F. T. Wood, Macmillan, 2007
3. Exercises in Spoken English, Parts I-III, CIEFL, Hyderabad, Oxford University Press
4. Fowler's Modern English Usage-Revised, R. W. Burchfield
5. Technical Communication, Raman, Meenakshi and Sharma, Sangeeta, Oxford University Press, 2005

ONLINE RESOURCES:
1. https://caw.ceu.edu/academic-skills
2. https://www.biz-e-training.com/resources-for-learners/academic-writing-online-resources/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES2ME101) ENGINEERING WORKSHOP

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To know the different popular manufacturing process
- To gain a good basic working knowledge required for the production of various engineering products
- To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field
- To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand various types of manufacturing processes
CO-2: Fabricate/make components from wood and steels through hands on experience
CO-3: Understand different machining processes like turning, drilling, tapping, etc.
CO-4: Understand electrical and electronic components and their assembly

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	2	2	2	2	2	1	2	1	3	2	1	2	3	2
CO-2	2	1	2	2	2	1	2	1	3	2	1	2	3	2
CO-3	2	2	2	2	2	1	2	1	3	2	1	2	3	2
CO-4	2	1	2	2	2	1	2	1	3	2	1	2	3	2

LECTURES & VIDEOS:
1. Manufacturing Methods - Casting, Forming, Machining, Joining, Advanced Manufacturing Methods
2. CNC Machining, Additive Manufacturing
3. Fitting Operations & Power Tools
4. Electrical & Electronics
5. Carpentry
6. Plastic Moulding, Glass Cutting
7. Welding (Arc Welding & Gas Welding), Brazing
8. Power Tools
9. Printed Circuit Board

LIST OF EXPERIMENTS:

I. Carpentry
i. Cross lap joint
ii. Mortise & tenon joint

II. Fitting
i. Square fitting
ii. L-fitting

III. Arc Welding
I. Butt joint
II. Lap joint

IV. Smithy
i. Rectangular Tray (Tin smithy)
ii. U-hook (Black smithy)

V. Electrical & Electronics
i. Single lamp connection & Stair case connection
ii. Soldering and de-soldering on a PCB.

VI. Machine Shop
i. Step turning on lathe
ii. Drilling & tapping

TEXT BOOKS:
1. Workshop Manual, P. Kannaiah and K. L. Narayana, 3rd Edition, Scitech, 2015
2. Elements of Workshop Technology Vol. 1 & 2, S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, 13th Edition, Media Promoters & Publishers Pvt. Ltd., 2010
3. Printed Circuit Boards - Design, Fabrication, Assembly and Testing, R. S. Khandpur, Tata McGraw-Hill, 2005

REFERENCES:
1. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R. Schmid, 4th Edition, Pearson Education India Edition, 2002
2. Manufacturing Technology-I, S. Gowri, P. Hariharan and A. Suresh Babu, Pearson Education, 2008
3. Processes and Materials of Manufacture, Roy A. Lindberg, 4th Edition, Prentice Hall India, 1998
4. Manufacturing Technology Vol-1 & 2, P. N. Rao, Tata McGraw-Hill, 2017

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22BS2PH101) ENGINEERING PHYSICS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To understand the working principle of lasers and optical fibers
- To analyze the characteristics of semiconductor devices and resonance phenomena
- To measure the time constant of RC circuit and dielectric constant of material
- To study the behavior of magnetic materials and understand least square method
- To compare the experimental results with the classroom learning

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the total internal reflection in optical fiber using lasers
CO-2: Realize importance of optoelectronics and resonance in daily life
CO-3: Illustrate discharging of a capacitor and polarizability of dielectric material
CO-4: Identify the importance of least square fitting and applications of magnetic materials
CO-5: Correlate the experimental results with the classroom learning

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

LIST OF EXPERIMENTS:

1. Torsional pendulum: understanding the method of least squares.
2. Determination of acceptance angle and numerical aperture of an optical fiber.
3. Determination of wavelength of given LASER using grating.
4. Determine the width of given wire- using LASER
5. Determination of the beam divergence of a given LASER.
6. V-I characteristics of light emitting diode (LED)
7. V-I Characteristics of solar cell.
8. Measurement of dielectric constant.
9. Study the B-H curve of magnetic material.
10. Determination of time constant of RC circuit.
11. Melde's Experiment
12. AC frequency sonometer

TEXT BOOKS:
1. Engineering Physics Laboratory Manual/Observation, Physics Faculty of VNRVJIET
2. A Textbook of Practical Physics, S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017

ONLINE RESOURCES:
1. https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1
2. https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1518&cnt=1

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22SD5CE101) ELEMENTS OF CIVIL ENGINEERING

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME						
D-D	PE	LR	CP	VV	SEE	TOTAL
10	10	10	10	10	-	50

COURSE OBJECTIVES:
- To know the various minerals and rocks used in construction and their importance
- To understand the different physical tests conducted on cement as per Indian Standard (IS) specifications
- To know the physical tests on fine aggregate and coarse aggregate for construction as per IS code
- To understand the mechanical requirements of coarse aggregate as pavement material as per the IS code

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify different minerals and rocks used in construction
CO-2: Conduct various physical tests on cement as per IS codal specifications
CO-3: Determine the physical properties of fine aggregate and verify their requirement as per IS code
CO-4: Check the suitability of coarse aggregate for pavement construction as per IS codal specifications

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	1	1	2	-	-	-	1	2	2	-	-	1	1	2
CO-2	2	1	2	3	-	-	-	2	2	2	-	-	1	1	2
CO-3	2	1	2	3	-	-	-	2	2	2	-	-	1	1	2
CO-4	2	1	3	3	-	-	-	2	2	2	-	-	1	1	2

LIST OF EXPERIMENTS:

1. **Identification of Minerals:** Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks:** Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. Tests on Cement
   a) Specific Gravity
   b) Consistency
   c) Setting times
4. Tests on Fine Aggregates
   a) Specific Gravity
   b) Bulking of Sand
   c) Fineness Modulus

5. Tests on Coarse Aggregate
   a) Specific Gravity
6. Tests on Aggregates for Pavements
   a) Flakiness and Elongation Index
   b) Aggregate Impact Value
   c) Aggregate Crushing Value

TEXT BOOKS:
1. Textbook of Engineering Geology, N. Chenna Kesavulu, 3rd Edition, Trinity Press
2. Engineering and General Geology, Parbin Singh, Katson Educational Series
3. Concrete Technology, A. M. Neville and J. J. Brooks, Prentice Hall

REFERENCES:
1. Concrete Technology, M. S. Shetty, S. Chand & Co.
2. IS: 269 - 2015 (Reaffirmed 2020), Ordinary Portland Cement - Specification (Sixth Revision), Bureau of Indian Standards, New Delhi, 2015
3. IS: 383 - 2016, Coarse and Fine Aggregate for Concrete - Specification (Third Revision), Bureau of Indian Standards, New Delhi, 2016

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22BS1MT102) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

TEACHING SCHEME		
L	**T/P**	**C**
2	**1**	**3**

EVALUATION SCHEME				
SE	**CA**	**ELA**	**SEE**	**TOTAL**
30	**5**	**5**	**60**	**100**

COURSE PRE-REQUISITES: Differentiation, Integration, Vectors, Vector Point Function

COURSE OBJECTIVES:
- To methods of solving first order differential equations and learn about its applications to basic engineering problems
- To methods of solving higher order differential equations and learn about its applications to basic engineering problems
- To application of Laplace transforms in solving differential equations
- To basic properties of vector point function and their applications to line, surface and volume integrals

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Formulate and solve the problems of first order differential equations
CO-2: Solve the problems of second and higher order differential equations
CO-3: Apply knowledge of Laplace transform to solve differential equations
CO-4: Find the gradient, divergence, curl and its physical interpretations
CO-5: Transform line integral to surface and surface to volume integrals

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial****)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-	-

UNIT-I:
First Order, First Degree ODE and its Applications:
Differential Equations of First Order and First Degree: Exact and non-exact differential equations, Linear and Bernoulli differential equations, Applications of differential equations of first order and first degree: Newton's law of cooling, Law of natural growth and decay.

UNIT-II:
Second and Higher Order Ordinary Differential Equations: Higher order linear differential equations with constant coefficients - Solution of Homogenous, Non homogeneous differential equations-Non-Homogeneous terms of the type eax,sin (ax), cos (ax), polynomials in x, eaxV(x), xV(x).Variable coefficient differential equations-Method of variation of parameters, Euler-Cauchy differential equation.

UNIT-III:
Laplace Transforms: Laplace transforms, Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms (Without Proofs), Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function). Inverse Laplace transform and its properties, Convolution theorem (without proof) and its applications, solving linear differential equations with constant coefficients using Laplace transform.

UNIT-IV:
Vector Differential Calculus: Vector point functions and scalar point functions. Gradient and its physical interpretation, Angle between the two surfaces, Directional derivatives, Divergence, Curl and their physical interpretations, Solenoidal vectors and Irrotational vectors, Scalar potential functions, Vector Identities (without proofs).

UNIT-V:
Vector Integral Calculus
Line Integrals: Work done by force and circulation, Evaluation of Surface and Volume Integrals. Vector integral theorems: Green's theorem, Gauss-Divergence theorem, Stokes theorem (without proofs) and their problems.

TEXT BOOKS:
1. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Narosa Publications
2. Higher Engineering Mathematics, B.V. Ramana, 11th Reprint, Tata McGraw-Hill, 2010
3. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley

REFERENCES:
1. Advanced Engineering Mathematics, Peter 'O' Neil, Cengage Learning
2. Engineering Mathematics, N. P. Bali, 4th Edition, Laxmi Publications
3. Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, 9th Edition, Pearson, 2002

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22BS1CH101) ENGINEERING CHEMISTRY

TEACHING SCHEME		
L	**T/P**	**C**
3	0	3

EVALUATION SCHEME				
SE	**CA**	**ELA**	**SEE**	**TOTAL**
30	5	5	60	100

COURSE PRE-REQUISITES: General Chemistry and Basic Mathematics

COURSE OBJECTIVES:
- To analyze the quality of water for sustainable living
- To acquire the knowledge about polymer science and its applications in various fields
- To outline the importance of non-conventional energy sources and portable electric devices
- To imbibe the conceptual knowledge of corrosion science
- To recognize the significance of advanced materials for sustainable living

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Assess the specification of water regarding its usage in domestic & Industrial scenarios
CO-2: Analyze the efficacy of polymers in diverse applications
CO-3: Recognize the transformations in energy sources & battery technology
CO-4: Predict the suitable corrosion control methods in safeguarding the structures
CO-5: Interpret the role of advanced materials for better efficiency in various sectors

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

UNIT-I:
Water and its Treatment: Introduction- Hardness - causes, expression of hardness, units of hardness, types of hardness, Numerical problems (temporary & permanent hardness of water). Estimation of hardness by EDTA method.
Potable water and its specifications. Steps involved in the treatment of potable water – screening, sedimentation, coagulation, filtration, and disinfection methods- boiling, chlorination (By Chlorine gas, Bleaching powder, Chloramine), Breakpoint of chlorination.
Boiler troubles - boiler corrosion, caustic embrittlement, scale & sludge formation. Internal treatment- Calgon, phosphate, and colloidal conditioning, External treatment - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis and its advantages.

UNIT-II:

Polymer Science: Definition – Classification of polymers with examples, Types of polymerizations, addition, and condensation polymerization with examples. Properties of polymers- crystallinity & glass transition temperature.

Plastics: Definition and characteristics-thermoplastic and thermosetting plastics, Preparation, Properties, and applications of Teflon, PMMA, PC, PET, Bakelite. Moulding of Plastics (Compression, Extrusion, Blow moulding and Thermoforming).

Conducting Polymers: Classification and applications of conducting polymers.

Shape Memory Polymers (SMPs): Definition, classification based on their mode of activation (thermo-responsive, light-responsive, electrically, magnetically Induced and water activated -brief note) and applications of SMPs in various fields.

UNIT-III:

Energy Sources & Battery Technology: Definition and characteristics of fuel, Types of fuels, analysis of coal – proximate and ultimate analysis. Petroleum and its Refining, Cracking- Definition, types -moving bed catalytic cracking process. Knocking – octane and cetane rating, Gaseous fuels –Types of hydrogen fuel, generation of green hydrogen-mechanism of electrolysis of water.

Battery Technology: Definition, Characteristics of a good battery, Classification of batteries- primary, secondary, reserve and fuel cells with examples.

Primary Batteries: Zn-air battery-Construction and working.

Rechargeable Batteries: Construction and working of lithium-ion battery and its importance in electric vehicles.

Fuel Cell: Definition, construction, working, principle, and applications of methanol-oxygen fuel cell.

UNIT-IV:

Corrosion and its Control: Introduction causes and effects of corrosion, mechanism of chemical and electrochemical corrosion. Types-differential aeration corrosion (Pitting and waterline corrosion), differential metal corrosion (Galvanic corrosion).

Factors affecting corrosion-nature of metal (position, passivity, purity, areas of anode and cathode) & nature of environment (temperature, pH, humidity).

Corrosion control methods - cathodic protection-Sacrificial anodic and impressed current cathodic protection, comparison of galvanizing and tinning.

UNIT-V:

Advanced Materials:

Composites: Introduction, need for composites, classification of composites-Fibre reinforced composites-Glass fibre, carbon fibre and aramid fibre-Features and applications, Hybrid composites-natural and synthetic.

Self -healing materials-Features, principle, and applications.

Lubricants-Definition and need for lubricants, types- liquid, semi-solid, solid, mechanisms of lubrication-thick film lubrication, thin film lubrication and extreme pressure lubrication. Properties of lubricants-viscosity, cloud and pour point, flash and fire point, their definition and significance. Biodegradable lubricants-Definition, comparison with conventional lubricants, applications.

TEXT BOOKS:

1. Engineering Chemistry, P. C. Jain and M. Jain, Dhanpat Rai, 2010
2. Engineering Chemistry, Rama Devi, Venkata Ramana Reddy and Rath, Cengage Learning, 2016

REFERENCES:
1. Engineering Chemistry, Shikha Agarwal, Cambridge University Press, 2015
2. Engineering Chemistry, Shashi Chawla, Dhanpat Rai and Company, 2011
3. A Textbook of Engineering Chemistry, M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021
4. Textbook of Engineering Chemistry, Jaya Shree Anireddy, Wiley Publications

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES1CE101) APPLIED MECHANICS

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Mathematics, Physics

COURSE OBJECTIVES:
- To understand the resolution of forces and moment systems for equilibrium
- To discuss various laws and concepts of friction
- To understand the importance and applications of centroid and area moment of inertia about any axes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze the systems using equilibrium conditions and apply the concepts of mechanics to engineering applications
CO-2: Apply the laws of friction and analyze the bodies under impending motion
CO-3: Determine the centroid of plane, composite areas and centre of gravity of volumes
CO-4: Determine the moment of inertia of plane and composite areas

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	-	-	-	-	-	-	-	1	2	1
CO-2	3	3	1	1	-	-	-	-	-	-	-	-	1	2	1
CO-3	3	3	1	1	-	-	-	-	-	-	-	-	1	2	1
CO-4	3	3	1	1	-	-	-	-	-	-	-	-	1	2	1

UNIT-I:
Forces: Introduction to Engineering Mechanics – Basic concepts - Classification of a force system - Parallelogram law of forces - Triangle law of forces - Polygon law of forces – Law of transmissibility of forces – Principle of superposition – Lami's theorem - Free Body Diagram – Resultant – Equilibrant - Resultant of coplanar concurrent forces - Equations of Equilibrium of Coplanar Systems.

UNIT-II:
Moments: Moment of a force – Varignon's principle - Parallel forces - Resultant of parallel forces – Couple - Moment of a couple about any point lying in the plane - Resolution of a force into a force-couple and vice-versa - Resultant of coplanar non-concurrent forces – Beams – Cantilever beams – Simply supported beams – Over hanging beams – Subjected to concentrated loads and moments – uniformly distributed loads and uniformly varying loads – Determination of support reactions.

UNIT-III:

Friction: Types of Friction - Limiting friction - Laws of friction - Equilibrium of bodies on rough horizontal and inclined planes - Equilibrium of connected bodies on rough horizontal and inclined planes.

UNIT-IV:

Centroid and Centre of Gravity: Introduction - Centroid - Centroids of lines, areas and volumes – Centroids of composite areas - Centre of gravity of bodies.

UNIT-V:

Area Moment of Inertia: Introduction - Inertia - Inertia of areas - Radius of gyration - Polar moment of inertia - Parallel axis theorem – Perpendicular axis theorem - Moment of inertia of standard sections and composite sections.

TEXT BOOKS:
1. Engineering Mechanics, S. Timoshenko, D. H. Young, J. V. Rao and Sukumar Pati, McGraw-Hill
2. Singers Engineering Mechanics (Statics and Dynamics), K. Vijaya Kumar Reddy & J. Suresh Kumar, B. S. Publications
3. Engineering Mechanics, S.S. Bhavikatti, New Age International

REFERENCES:
1. Engineering Mechanics, J. L. Meriam & L. G. Kraige & J. N. Bolton, Wiley India Edition, Wiley Publishers
2. Engineering Mechanics, R. C. Hibbeler, Pearson Education
3. Engineering Mechanics: Statics and Dynamics, A. K. Tayal, Umesh Publications
4. Problems and Solutions in Engineering Mechanics, S. S. Bhavikatti & A. Vittal Hedge, New Age International

ONLINE RESOURCES:
1. https://archive.nptel.ac.in/courses/112/106/112106286/
2. https://nptel.ac.in/courses/112103108

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22PC1CE102) SURVEYING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Mathematics, Physics

COURSE OBJECTIVES:
- To understand the fundamental methods for linear and angular measurements
- To evaluate the reduced levels for the estimation of earthwork quantities, reservoir capacity and preparation of contours
- To implement the principles of trigonometry for the determination of horizontal and vertical distances
- To correlate the importance of modern surveying techniques adopted in real world situation

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply principles of surveying for linear measurement
CO-2: Develop contour map and estimate the earthwork quantities required for civil engineering constructions
CO-3: Identify appropriate methods for curve setting and measurement of horizontal distances and vertical elevations.
CO-4: Apprise the importance of modern instruments used in geomatics

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	2	-	-	-	1	-	-	-	-	-	-	3	-	-
CO-2	3	3	-	-	-	1	-	2	-	-	-	-	3	-	-
CO-3	3	3	2	-	-	1	-	2	-	-	-	-	3	-	-
CO-4	1	2	-	-	-	1	-	-	-	-	-	2	3	-	-

UNIT-I:
Introduction to Surveying: Classification; Principles of surveying; Plan, Map, Scale; Errors in surveying; Chain surveying; Principles and accessories
Compass Surveying: Prismatic compass; angular measurements, bearings, dip, deciliation; local attraction.

UNIT-II:
Simple Levelling: Basic definitions; methods of levelling; Curvature and Refraction; Contour: contour interval, characteristics of contours, methods of plotting of contours, uses of contour maps
Areas and Volumes: Simpson's rule; boundaries with offsets at irregular intervals; coordinate method; level section; two level section; trapezoidal and prismoidal rule; capacity of a reservoir

UNIT-III:

Theodolite Survey & Traversing: Theodolite: parts, basic definitions, fundamental lines; measurement of a horizontal angle; repetition and reiteration; measurement of vertical angle

Trigonometric Levelling: Base of the object accessible, base of an inclined object accessible, reduced level of the elevated points with inaccessible bases.

UNIT-IV:

Tacheometric Surveying: Tacheometric measurement and constants; Inclined sight with staff held vertical; inclined sight with staff held normal to the inclined line of sight

Curves: Elements of curve; designation of a curve; relationship between radius and degree of curve; types of curves; methods of setting out for simple circular curve: Linear methods - Offsets from long chord produced, Angular methods – Rankine's method of deflection angle

UNIT-V:

Modern Field Survey Systems: Principle of Electronic Distance measurement; types of EDM instruments, total station, parts, accessories – advantages and applications, Global Positioning Systems-Segments, GNSS. Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; ground control extension for photographic mapping; photographic mapping

TEXT BOOKS:
1. Surveying, Arora K. R., Vol. I, II and III, Standard Book House, 2019
2. Elementary Surveying - An Introduction to Geomatics, Charles D. Ghilani, Paul R. Wolf., Pearson India, 2018
3. Surveying, Duggal S. K., Vol. I and II, Tata McGraw-Hill, 2017

REFERENCES:
1. Surveying I & II, B. C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Laxmi Publications, 2016
2. Advanced Surveying: Total Station, GIS and Remote Sensing, Satheesh Gopi, Sathi Kumar R. and Madhu N., Pearson India, 2017
3. Surveying & Levelling, R. Subramanian, Oxford University Press, New Delhi, 2013

ONLINE RESOURCES:
1. https://nptel.ac.in/courses/105104100
2. https://onlinecourses.nptel.ac.in/noc22_ce78/preview

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22PC1CE103) BUILDING CONSTRUCTION AND PLANNING

TEACHING SCHEME		
L	**T/P**	**C**
2	**0**	**2**

EVALUATION SCHEME				
SE	**CA**	**ELA**	**SEE**	**TOTAL**
30	**5**	**5**	**60**	**100**

COURSE PRE-REQUISITES: Civil Engineering Materials

COURSE OBJECTIVES:
- To identify the different components of a building and know the different types of bricks, brick bonds and formwork used in construction
- To comprehend the principles of building planning and discuss the different building services
- To compare the different construction equipment used in the industry and suggest the appropriate equipment for construction
- To understand the features of green buildings and their importance in the present day context of sustainable development

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Describe the different building components, formwork and finishes used in construction
CO-2: Plan a building with appropriate building services
CO-3: Choose an appropriate construction equipment
CO-4: Elucidate the benefits, features and rating systems for a green building

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**
CO-1	2	-	1	-	-	-	-	-	-	-	-	-	1	2	2
CO-2	2	-	3	-	-	3	2	-	-	-	-	-	1	2	2
CO-3	2	-	1	-	1	-	-	-	-	-	-	-	1	2	2
CO-4	2	-	3	-	-	3	3	-	-	-	-	-	1	2	2

UNIT-I:
Building Components: Building Components - Structural and Non-Structural components - Foundations – Types and Applications - Damp Proof Course - Methods and Treatment - Lintels – Types - Walls – Load Bearing and Non-Load Bearing Walls - Stair cases – Types - Floors - Types - Roofs - Types - Doors – Types - Windows – Types.

UNIT-II:
Masonry: Brick Masonry - Bonds - English and Flemish Bonds - Stone Masonry – Types.
Formwork and Finishing: Classification of Temporary Structures – Scaffolding – Types – Shoring - Underpinning - Finishes – Plastering - Pointing - Claddings – Types.

UNIT-III:
Building Services: Plumbing Services - Water Distribution System – Water Supply Fittings and Fixtures – Traps – Sanitary Appliances – Ventilators – Heating, Ventilation & Air Conditioning (HVAC) - Functional Requirements – Types - Acoustics – Characteristic – Absorption – Acoustic Design; Fire Protection – Fire Hazards.

UNIT-IV:
Construction Equipment: Trucks and other Earth Moving Equipment - Power Showels – Dozers – Scrappers - Draglines and Clean Shells - Earth Compaction Equipment - Belt Conveyors - Concrete Mixers – Concrete Vibrators – Concrete Pumps – Bar Bending Machine - Cranes – Tower Cranes.

UNIT-V:
Building Planning: Principles of Building Planning - Classification of Buildings - Building Bye Laws – Building Information System
Introduction to Green Buildings: Definition of Green Buildings - Benefits of Green Buildings - Typical features of Green Buildings - Green Building Materials - Overview of Green Building rating systems: BREAM, LEEED and GRIHA.

TEXT BOOKS:
1. Building Construction, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications
2. Building Construction, P. C. Varghese, PHI Learning
3. Green Building Fundamentals, G. Harihara Iyer, notionpress.com

REFERENCES:
1. Fundamentals of Building Construction, T. D. Ahuja and G. S. Birdi, Dhanpat Rai Publishing
2. Building Construction, S. C. Rangwala, Charotar Publishing House
3. Building Construction, Arora and Bindra, Dhanpat Rai Publications

ONLINE RESOURCES:
1. https://archive.nptel.ac.in/courses/105/103/105103206/
2. https://www.worldgbc.org/about-green-building

CODES:
1. National Building Code of India 2016 (Vol I and II), Bureau of Indian Standards, New Delhi
2. Building Bye Laws, State and Central Governments and Municipal Corporations

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES3CE101) COMPUTER AIDED ENGINEERING GRAPHICS

TEACHING SCHEME		
L	T/P	C
0	6	3

EVALUATION SCHEME				
D-D	SE	CP	SEE	TOTAL
10	20	10	60	100

COURSE OBJECTIVES:
- To learn basic AutoCAD skills
- To learn various curves used in engineering practice, orthographic projections and projections of planes & solids
- To learn sections and sectional views of prisms, pyramids, cylinders and cones
- To learn isometric projections, transformation of projections of brick bonds
- To learn basic sign conventions of various building materials

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Draw various types of scales, various curves used in engineering practice using AutoCAD
CO-2: Draw orthographic projections and sectional views of planes and solids
CO-3: Draw isometric projection and transformation of projections of Brick bonds
CO-4: Draw sign conventions of building materials and line plan of single room

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	-	3	-	-	1	-	-	-	-	3	-	-
CO-2	3	2	2	1	3	-	-	1	-	-	-	-	3	-	-
CO-3	3	2	1	-	3	-	-	1	-	-	-	-	3	-	-
CO-4	3	2	2	1	3	-	-	1	-	-	-	2	3	-	-

UNIT-I:
Introduction to Engineering Graphics: Principles of engineering graphics and their significance. – Size of drawing sheets, Types of lines, lettering, Dimensioning, Title block - Drawing instruments and their uses - Different types of scales, Conic Sections – construction of Ellipse, Parabola, Hyperbola, & Rectangular Hyperbola – General method only
Introduction to Auto CAD: Views, Commands, and printing setup.

UNIT-II:
Principles of Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures – inclined to both planes by first angle project method.

UNIT-III:
Projection of solids: Projections of Regular Solids – inclined to one and inclined to both the planes - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, and Cone – Auxiliary Planes.

UNIT-IV:

Isometric Projections: Principles of isometric projections, isometric views, conventions, isometric projection of planes – Application to brick bonds

Transformation of Projections: Conversion of isometric views to orthographic views conventions and vice versa.

UNIT-V:

Sign Conventions: Stone, Sand filling, Mortar, Concrete, Glass, Steel, Aluminium, Earth, Rock and Timber, doors, and windows.

Introduction to Line Plan of Buildings: Line plan of building, Introduction to Building Information Modelling (BIM)

TEXT BOOKS:
1. Engineering Drawing, N. D. Bhatt, 5th Edition, Charotar Publishing House, 2016
2. Engineering Drawing, Basant Agrawal, 2nd Edition, McGraw-Hill, 2014

REFERENCES:
1. Engineering Drawing with AutoCAD, K. Venkata Reddy, 4th Edition, B. S. Publications, 2009
2. Civil Engineering Drawing, I. N. Sreenivasulu, S. Rama Rao, Radiant Publishing House, 2017
3. Engineering Drawing, M. B. Shah, 2nd Edition, Pearson Education, 2011
4. Engineering Drawing and Graphics, K. Venugopal, 4th Edition, New Age International, 2007

ONLINE RESOURCES:
1. https://nptel.ac.in/courses/112103019
2. https://nptel.ac.in/courses/112105294

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22PC2CE102) SURVEYING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Mathematics, Physics

COURSE OBJECTIVES:
- To apply the concepts of leveling for determining longitudinal and cross-sectional profile
- To develop contour maps through in-direct method of leveling
- To understand the principles of trigonometric and tacheometric surveying for measurement of horizontal and vertical distances
- To appreciate the applications of optical instruments for setting out of curve

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Establish bench mark and determine the reduced levels of various points
CO-2: Construct profile of a given ground location and develop contour maps
CO-3: Determine horizontal and vertical distances of accessible and inaccessible points
CO-4: Set out simple horizontal curves using optical instruments

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial****)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	1	-	-	-	-	-	1	2	-	-	-	3	-	-
CO-2	2	2	-	-	-	-	-	1	2	-	-	-	3	-	-
CO-3	2	3	-	2	-	-	-	1	2	-	-	-	3	-	-
CO-4	2	3	-	2	-	-	-	1	2	-	-	-	3	-	-

LIST OF EXERCISES:

1. Fly levelling
2. Differential levelling
3. Longitudinal levelling
4. Cross -sectional levelling
5. Contouring
6. Measurement horizontal angle – Repetition method
7. Measurement horizontal angles – Reiteration method
8. Measurement vertical angles
9. Distance between two inaccessible points using the principles of trigonometric levelling
10. Determination of tacheometric constants
11. Distance between two inaccessible points using the principles of tacheometer
12. Setting out of simple circular curve

REFERENCES:

1. Surveying, Arora K. R., Vol. I, II and III, Standard Book House, 2019
2. Surveying, Duggal S. K., Vol. I & II, Tata McGraw-Hill, 2017
3. Surveying I & II, B. C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Laxmi Publications, 2016

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22BS2CH101) ENGINEERING CHEMISTRY LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Basic Knowledge of Volumetric Analysis and Mathematics

COURSE OBJECTIVES:
- To understand the preparation of standard solutions and handling of instruments
- To determine and evaluate the water quality
- To measure physical properties like absorption of light, surface tension, pH, conductance and viscosity of various liquids
- To conduct and collect the experimental data using different laboratory techniques
- To summarize the data and find the applicability to real world scenario

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Learn and apply the basic laboratory methodologies for the preparation of the standard solutions and handling of instruments
CO-2: Estimate the ions / metal ions present in domestic and industrial water
CO-3: Utilize the instrumental techniques to assess the physical properties of oils and water
CO-4: Analyze the experimental data to predict solutions for complex engineering problems
CO-5: Apply the skills gained to solve societal issues related to real world scenario

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO-5	3	2	1	-	-	1	1	1	2	1	-	2	-	-

LIST OF EXPERIMENTS:

1. Estimation of hardness of water by complexometric method using EDTA.
2. Determination of chloride content in the given sample water using Argentometric method.
3. Estimation of copper present in the given solution by colorimetric method.
4. Conductometric titration of Acid vs Base.
5. Titration of Acid vs Base using pH metric method.
6. Conductometric titration of mixture of strong acid and weak acid by strong base
7. Determination of viscosity of sample oil by Redwood Viscometer-I.

8. Estimation of acid value of given lubricant oil.
9. Determination of surface tension of a liquid by drop method using Stalagmometer.
10. Synthesis of a Polymer-Bakelite/Nylon.

VIRTUAL LAB EXPERIMENTS:

11. Basic operations of Transmission Electron Microscope (Imaging and Diffraction Pattern)
12. Polymer processing technology- study construction and working of compression moulding.
13. Basics of Scanning Electron Microscopy: Secondary Electron and BSE imaging mode.
14. Batteries for electrical vehicles

TEXT BOOKS:
1. Laboratory Manual on Engineering Chemistry, S. K. Bhasin and Sudha Rani, Dhanpat Rai Publications
2. College Practical Chemistry, V. K. Ahluwalia, Sunitha Dhingra, Adargh Gulati, University Press Pvt. Ltd.
3. Practical Chemistry, Dr. O. P. Pandey, D. N. Bajpai, and Dr. S. Giri, S. Chand Publications

REFERENCES:
1. Vogel's Text book of Quantitative Chemical Analysis, G. N. Jeffery, J. Bassett, J. Mendham and R. C. Denny, Longmann, ELBS
2. Advanced Practical Physical Chemistry, J. D. Yadav, Goel Publishing House
3. Practical Physical Chemistry, B. D. Khosla, R. Chand and Sons

ONLINE RESOURCES: (Virtual labs)
1. https://emb-iitk.vlabs.ac.in/exp/transmission-electron-microscope
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/polymer_process/experimentlist.html
3. https://emb-iitk.vlabs.ac.in/exp/sem-basics/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES2DS101) PYTHON PROGRAMMING LABORATORY

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To install and run the Python interpreter
- To learn control structures
- To understand lists, dictionaries in Python
- To handle strings and files in Python
- To acquire programming skills in core Python

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Develop the application specific codes using python
CO-2: Understand strings, lists, tuples and dictionaries in Python
CO-3: Verify programs using modular approach, file I/O, Python standard library
CO-4: Implement digital Systems using Python
CO-5: Develop the skill of designing graphical user interfaces in Python

COURSE ARTICULATION MATRIX:
(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	3	3	2	3	2	2	1	2	2	2	3	3	2	3
CO-2	3	2	3	3	2	3	3	2	1	2	3	3	2	3	3
CO-3	3	2	3	1	2	3	2	3	2	1	2	3	2	1	2
CO-4	3	2	3	2	3	2	3	2	2	2	3	3	3	2	1
CO-5	3	2	3	3	3	3	3	2	3	3	2	3	1	2	3

WEEK-1: Basics

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. Write a program to purposefully raise Indentation Error and correct it
4. i) Write a program to calculate compound interest when principal, rate and number of periods are given.
ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
5. Read name, address, email and phone number of a person through keyboard and print the details.

WEEK- 2: Operations

1. Print the below triangle using for loop.

5

4 4

3 3 3

2 2 2 2

1 1 1 1 1

2. Write a program to check whether the given input is digit or lowercase character or uppercase

character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop

4. Python program to print all prime numbers in a given interval (use break)

5. Write a program to compute LCM of two numbers by taking input from the user

6. Write a program add.py that takes 2 numbers as command line arguments and prints its sum

WEEK-3: Lists & Tuples

1. i) Write a program to convert a list and tuple into arrays.

 ii) Write a program to find common values between two arrays.

2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.

3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

4. Find mean, median, mode for the given set of numbers in a list.

5. Write a Python program to create a tuple.

6. Write a Python program to create a tuple with different data types.

7. Write a Python program to check whether an element exists within a tuple.

WEEK-4: Sets, Dictionaries and Strings

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.

2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

i). Write a function called remove_duplicates that takes a list and returns a new list with only the

unique elements from the original. Hint: they don't have to be in the same order.

ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add

"I", "a", and the empty string.

iii). Write a python code to read dictionary values from the user. Construct a function to invert its

content. i.e., keys should be values and values should be keys.

3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'

ii) Remove the given word in all the places in a string?

iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every

word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4. Writes a recursive function that generates all binary strings of n-bit length

5. Write a Python program to implement all set operations

6. Write a program to check whether a string is palindrome or not

WEEK-5: Functions and Multi-D Lists

1. i) Write a python program that defines a matrix and prints

 ii) Write a python program to perform addition of two square matrices

 iii) Write a python program to perform multiplication of two square matrices

2. Simple Calculator program by making use of functions

3. Find the factorial of a number using recursion

4. Write a function cumulative_ product to compute cumulative product of a list of numbers.

5. Write a function reverse to print the given list in the reverse order.

WEEK-6: Exceptions in Python

1. Write a program that detects an Exception

2. Write a program that raise an Exception (divide by zero error,voter's age validity

3. Write a program that raise an Exception as string(), student mark range validation)

4. Use the structure of exception handling all general purpose exceptions.

5. Write a python code to read a phone number and email-id from the user and validate it for

correctness.

WEEK-7: Modules and Inheritance

1. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.

2. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.

c. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.

d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.

3. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritance.

WEEK-8: Files

1. Write a Python code to merge two given file contents into a third file.

2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.

3. Write a Python code to Read text from a text file, find the word with most number of occurrences

4. Write a function that reads a file file1 and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

5. Write a program to print each line of a file in reverse order.

WEEK-9: Exploration of NumPy Package
1. Import numpy, and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program for slicing arrays using numpy
4. Write a program for Math operations on array using numpy
5. Write a program for searching
6. Write a program for sorting

WEEK-10: Exploration of Pandas Package
1. Import Pandas and Plotpy and explore their functionalities
2. Python Data Frame
3. Python series

WEEK-11: Exploration of SciPy and GUI
1. Import SciPy and explore their functionalities
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

WEEK-12: Digital Logic Systems
1. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
2. Write a program to implement Half Adder, Full Adder, and Parallel Adder

TEXT BOOKS:
1. Supercharged Python: Take Your Code To The Next Level, Overland
2. Learning Python, Mark Lutz, O'reilly
3. Python for Data Analysis, Wes McKinney, 2nd Edition, Orielly

REFERENCES:
1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22MN6HS102) ENVIRONMENTAL SCIENCE

TEACHING SCHEME		
L	**T/P**	**C**
2	0	0

EVALUATION SCHEME			
SE-I	**SE-II**	**SEE**	**TOTAL**
50	50	-	100

COURSE PRE-REQUISITES: Basic knowledge on environmental issues

COURSE OBJECTIVES:
- To recognize the impacts of human interventions towards environment
- To list out the benefits in creating a sustainable world
- To sketch out various activities in achieving a cleaner environment
- To emphasize the role of frontier technologies for a better planet to live

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain a variety of experiences & acquire a basic knowledge about the environment & its allied problems
CO-2: Interpret the key components in safeguarding the environment
CO-3: Appraise the quality of environment in order to create a healthy atmosphere
CO-4: Familiarize with the importance of emerging technologies towards green revolution

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)**

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)	
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-

MODULE 1:
Introduction to Environmental Science: Importance of Environmental Science, Overview of the environment & its components, Human intervention in destruction or sustenance of environment. Relationship between environmental science & society - Influence of Industry, Innovation & infrastructure on environment

MODULE 2:
Synergy With Environment: Health & Well Being-ensuring healthy lives and promoting wellbeing at all ages. Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. Life under water and on land-conservation & sustainable usage, measures to protect marine & coastal ecosystems from various impacts. Protect and restore terrestrial ecosystems, sustainably managing forests, combat desertification. Biodiversity a valuable resource- biological diversity as a support for food, water, medicine, shelter, cleaning of air and water and other material goods for sustaining life and increase resilience

MODULE 3:

Climate Change: Science behind climate change-factors responsible for climate change, Scientific evidence about past climate and present. Expected consequences of climate change- Impacts of climate change on growth and development. Role of greenhouse gases- Global temperature rise & its impact on environment & human health. Carbon footprint-Briefing on Paris agreement, Identify key sectors for low carbon footprint. Climate change mitigation & adaptation strategies

MODULE 4:

Moving Towards Sustainability: Eco-Audit and its importance. Sustainable agriculture-Organic farming and hydroponics. Role of AI & IOT for efficient management of environmental issues-Health, air, water, and soil. Sustainable living practices-minimizing waste, limited use of earth's natural resources, wise use of environment and ensuring quality working/living environments

MODULE 5:

Innovations in Environmental Science: Sustainable cities and communities-case study, Responsible consumption & production- Refuse, Reduce, Reuse and Recycle with examples. Innovative approaches to waste management-smart waste management, Plastic recycling-innovative ideas.

TEXT BOOKS:
1. Environmental Studies for UG Courses, Erach Bharucha, UGC Publications, 2004
2. Environmental Studies, Rajagopalan, Oxford University Press
3. Introduction to Climate Change, Andreas Schmittner, Oregon State University, 2018

REFERENCES:
1. Green Development: Environment and Sustainability in a Developing World, Bill Adams, 4th Edition, Routledge Publishers, 2021
2. Fixing Climate, Robert Kunzig & Wallace S. Broecker, Profile Books Publisher, 2009
3. Plastic Waste and Recycling-Environmental Impact, Societal Issues, Prevention and Solutions, 1st Edition, Academic Press 2020

ONLINE RESOURCES:
1. https://www.coursera.org/learn/beyond-the-sustainable-development-goals-addressing-sustainability-and-development
2. https://www.coursera.org/specialization/climatechangeandsustainableinvesting