DEPARTMENT OF

AUTOMOBILE ENGINEERING

VISION OF THE DEPARTMENT

To become and be one of the elite technical institutes acclaimed by the peers and industry with world class technical education, contemporary teaching facility and state-of-the-art laboratories to suit global standards

MISSION OF THE DEPARTMENT

- To provide engineering education with highest learning standards for designing and manufacturing of world class automobiles.
- To foster research, evolve innovative applications of state-of-the-art automotive technology, promote entrepreneurship and ultimately mould young men and women by inculcating ethical leadership qualities for the benefit of the society.

B.TECH.
(AUTOMOBILE ENGINEERING)

B.TECH. (AE)

PROGRAM EDUCATIONAL OBJECTIVES

PEO-I: Provide a strong foundation in mathematical, scientific and engineering fundamentals that enable the students to formulate, analyze and solve engineering problems and to prepare them for graduate studies.

PEO-II: Apply knowledge and concepts of automotive technology to synthesize data and solve multi-disciplinary engineering problems.

PEO-III: Work as part of teams for successful career in automotive and ancillary industry that meet the needs of Indian and multinational companies.

PEO-IV: Undertake research and development projects with multi-disciplinary approach which are cost effective and efficient so as to resolve automotive engineering issues of social relevance.

PEO-V: Demonstrate their professional, ethical and social responsibilities for a successful professional career and contribute their part for addressing various global issues.

B.TECH. (AE)

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. (AE)

PROGRAM SPECIFIC OUTCOMES

PSO-1: Use automobile engineering fundamentals, techniques, skills, latest modeling / design / analysis / simulation tolls, software and equipment necessary to evaluate and analyze the systems in automotive design environments.

PSO-2: Address specific problems in the field of automotive engineering in the form of projects for interpretation of data and synthesis of information to provide valid conclusions.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. I YEAR
AUTOMOBILE 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
22HS1EN101	English for Skill Enhancement	2	0	0	2	2
22ES1IT101	Problem Solving through C	3	0	0	3	3
22PC1AE101	Manufacturing Technology	2	0	0	2	2
22BS2PH101	Engineering Physics Laboratory	0	0	2	2	1
22HS2EN101	English Language and Communication Skills Laboratory	0	0	2	2	1
22ES2IT101	Problem Solving through C Laboratory	0	0	2	2	1
22ES2ME101	Engineering Workshop	1	0	2	3	2
22SD5AE101	Elements of Automobile 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
22ES1IT102	Data Structures through C	3	0	0	3	3
22ES1AE101	Fundamentals of Engineering Mechanics	3	0	0	3	3
22ES1EE103	Fundamentals of Electrical and Electronics Engineering	3	0	0	3	3
22ES3ME101	Engineering Graphics	0	0	4	4	2
22BS2CH101	Engineering Chemistry Laboratory	0	0	2	2	1
22ES2IT102	Data Structures through C Laboratory	0	0	2	2	1
22ES2EE103	Fundamentals of Electrical and Electronics Engineering Laboratory	0	0	2	2	1
22MN6HS102	Environmental Science	2	0	0	2	0
Total		**16**	**1**	**10**	**27**	**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

(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

(22ES1IT101) PROBLEM SOLVING THROUGH C

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To relate basics of programming language constructs and problem-solving techniques
- To classify and implement control structures and derived data types
- To analyze and develop effective modular programming
- To construct mathematical problems and real time applications using C language

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

CO-1: Understand fundamentals of computers and illustrate the flowchart, algorithm, pseudo code for a given problem, develop programs using various datatypes and operators

CO-2: Develop conditional and iterative statements for a given problem

CO-3: Exercise on programs using arrays

CO-4: Develop solution for a given problem using modular approach and perform file handling

CO-5: Exercise on programs using pointers, dynamic memory management, structures and unions

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	2	-	1	-	-	1	2	2	1	1	-	-
CO-2	1	2	1	-	2	-	1	-	1	2	2	-	-	-
CO-3	1	2	2	-	1	-	-	1	1	1	2	-	-	-
CO-4	2	2	2	1	2	1	2	1	-	2	2	1	-	-
CO-5	1	2	2	-	1	-	-	1	1	1	2	-	-	-

UNIT-I:

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flow chart / Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and logical errors in compilation, object and executable code. Arithmetic expressions and precedence.

UNIT-II:

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops

UNIT-III:
Arrays: Arrays (1-D, 2-D), Character arrays and Strings. Pre-Processor directives.

UNIT-IV:
Functions: (Including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.
Recursion: Recursion, as a different way of solving programs. Example programs, such as finding factorial, GCD, Fibonacci series

UNIT-V:
Structures & Unions: Defining structures and array of structures, Unions, Typedef, Bit-fields
Pointers: Idea of pointers, defining pointers, use of pointers in self-referential structures, notation of linked list (no implementation), dynamic memory allocation.

TEXT BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill

REFERENCES:

1. C: The Complete Reference, Herbert Schildt, IV Edition, McGraw-Hill
2. Let Us C, Yashvant Kanetkar, BPB Publications
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22PC1AE101) MANUFACTURING TECHNOLOGY

TEACHING SCHEME		
L	T/P	C
2	0	2

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

COURSE OBJECTIVES:

- To understand the various metal casting processes
- To impart the knowledge of various welding processes
- To understand the importance of mechanical working and sheet metal working processes
- To appreciate various plastic manufacturing processes

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Select the suitable casting technique for manufacturing of the components
CO-2: Recommend suitable welding processes for different applications
CO-3: Summarize the various mechanical working processes and sheet metal operations
CO-4: Demonstrate various plastic manufacturing processes

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	1	1	1	1	1	1	1	2	3	1	2	3	2
CO-2	3	1	1	1	1	1	1	1	2	3	1	2	3	2
CO-3	3	1	1	1	1	1	1	1	2	3	1	2	3	2
CO-4	3	1	1	1	1	1	1	1	2	3	1	2	3	2

UNIT-I:
Introduction: Manufacturing process - definition and classification.
Casting: Definition, steps involved in making a casting, advantage, disadvantages of casting and its applications, types of patterns – materials used for patterns, pattern allowances and types of foundry sands.
{*Limited to processes, advantages, disadvantages and applications only*}
Casting Processes: Centrifugal casting, die casting, investment casting, shell moulding – advantages and disadvantages, applications and casting defects.
Furnaces: Cupola furnace and electric arc furnace.
{*Limited to processes, advantages, disadvantages and applications only*}

UNIT-II:
Welding: Definition, classification of welding processes, types of welded joints, arc welding, gas welding, TIG and MIG welding, resistance welding, thermit welding, friction stir welding, soldering, brazing and welding defects.
{*Limited to processes, advantages, disadvantages and applications only*}

UNIT-III:

Mechanical Working Processes: Definition, Recrystallisation, Hot working, Cold working.

Rolling: Principle, Rolling stand arrangement, rolling defects

Forging Processes - Principle, tools and dies, types of forging - smith forging, drop forging and forging defects.

Extrusion – Principle, hot extrusion and cold extrusion, forward extrusion and backward extrusion, impact extrusion, hydrostatic extrusion and extrusion defects.

{*Limited to processes, advantages, disadvantages and applications only*}

UNIT-IV:

Sheet Metal Operations: Press tool operations - Classification, shearing action, blanking, piercing, trimming, shaving, nibbling, notching, lancing; bending and forming, drawing and its types: deep drawing, wire drawing and tube drawing, embossing and coining, spinning, bending and its types

{*Limited to processes, advantages, disadvantages and applications only*}

UNIT-V:

Processing of Plastics: Types of plastics, properties, advantages, disadvantages and applications.

Processing Methods: Blow molding, injection molding, compression molding and transfer molding.

{*Limited to processes, advantages, disadvantages and applications only*}

TEXT BOOKS:

1. Manufacturing Technology, P. N. Rao, Volume - I, 5th Edition, McGraw-Hill, 2018
2. Production Technology, R. K. Jain, Khanna Publishers, 2004

REFERENCES:

1. Elements of Workshop Technology S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy, Vol. 1, 13th Edition, Media Promoters & Publishers Pvt. Ltd., 2010
2. Manufacturing Processes, H. N. Gupta, R. C. Gupta, Arun Mittal, 2nd Edition, New Age International (P) Ltd.,, 2009
3. Manufacturing Engineering and Technology, Serope Kalpakjian, Steven R. Schmid, Fourth edition, Pearson Publishers, 2001
4. A Text Book of Production Technology, P. C. Sharma, 8th Edition, S. Chand Publishing, 2014
5. Principles of Modern Manufacturing, Mikell P. Groover, 5th Edition, Wiley, 2014

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/112107144
2. https://nptel.ac.in/courses/112104195

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

(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

(22ES2IT101) PROBLEM SOLVING THROUGH C 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 declare and manipulate single and multi-dimensional arrays of the C data types and derived data types like structures, unions
- To use functions from the portable C library and to describe the techniques for creating program modules using functions and recursive functions
- To manipulate character strings in C programs. Utilize pointers to efficiently solve problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use various data types for a specified problem
CO-2: Design, implement, debug a given problem using appropriate language constructs
CO-3: Implement programs using modular approach
CO-4: Solve a given problem using C language
CO-5: Implement programs on pointers, structures, unioin

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	2	2	-	1	-	-	1	-	1	-	1	-	-
CO-2	1	2	3	-	2	-	1	-	1	2	2	-	-	-
CO-3	1	2	2	2	1	2	-	1	1	1	2	-	-	-
CO-4	2	2	2	1	2	1	2	1		2	2	1	-	-
CO-5	1	2	3	-	2	-	1	-	1	2	2	-	-	-

LIST OF PROGRAMS:

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

WEEK 1: Familiarization with programming environment

WEEK 2: Simple computational problems using arithmetic expressions

WEEK 3: Problems involving if-then-else structures

WEEK 4: Iterative problems

WEEK 5: 1D Array manipulation

WEEK 6: Matrix problems(2D-arrays)

WEEK 7: Simple functions.

WEEK 8 AND WEEK 9: String operations

WEEK 10: Recursive functions

WEEK 11: Structures

WEEK 12: Pointers

TEXT BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill

REFERENCES:

1. C: The Complete Reference, Herbert Schildt, 4th Edition, McGraw-Hill
2. Let Us C, Yashvant Kanetkar, BPB Publications
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill

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 Boards

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

(22SD5AE101) ELEMENTS OF AUTOMOBILE 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 measure geometric properties like length, diameter, and angle
- To determine parameters like frequency, moment of Inertia and mechanical advantage
- To practice tools used in garage and powertrain working
- To understand automotive electrical symbols, colour codes and battery parameters

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

CO-1: Measure geometric properties like length, diameter and angle

CO-2: Evaluate the parameters like frequency, moment of Inertia and mechanical advantage

CO-3: Choose various tools used in garage and know about powertrain

CO-4: Identify the symbols, colour codes and measurement of battery parameters

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	1	1	-	-	1	-	1	2	1	-	1	2	2
CO-2	3	2	2	1	-	1	-	1	2	1	-	1	2	2
CO-3	3	1	1	-	-	1	-	1	2	1	-	1	2	2
CO-4	3	1	1	-	-	1	-	1	2	1	-	1	2	2

LIST OF EXPERIMENTS:

(Any **10 experiments** to be conducted from the following)

1. Measurement of length and diameter by vernier calipers and micrometer.
2. Measurement of angle by using Sine bar
3. Determination of time period and natural frequency of simple pendulum.
4. Determination of time period and natural frequency of compound pendulum.
5. The experimental determination of the moment of inertia of flywheel
6. Grouping of batteries for measurement of voltage and current using multimeter.
7. The experimental determination of mechanical advantage of screw jack
8. Identification and use of automotive garage tools
9. Dismantling and assembling of petrol engine
10. Dismantling and assembling of diesel engine
11. Study and demonstration of transmission system and its components
12. Study and demonstration of automotive wiring colour codes and electrical symbols

TEXT BOOKS:

1. Automotive Mechanics, William H. Crouse and Donald L. Anglin, 10th Edition, McGraw-Hill, 2017
2. Vehicle Maintenance and Garage Practice, Jigar A. Doshi, Dhruv U. Panchal and Jayesh P. Maniar, Prentice Hall India, 2014

REFERENCES:

1. Automotive Mechanics, S. Srinivasan, 2nd Edition, McGraw-Hill, 2017
2. Automobile Mechanics, N. K. Giri, 8th Edition, Khanna Publications, 2008
3. Advanced Vehicle Technology, Heinz Heisler, 2nd Edition, Butterworth Heinemann Publishers, 2002

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

(22ES1IT102) DATA STRUCTURES THROUGH C

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To summarize efficient storage mechanisms of data for an easy access
- To familiarize concepts of various linear data structures
- To introduce concept of non-linear data structures
- To develop applications using data structures

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

CO-1: Find time complexity notations for various sorting techniques

CO-2: Implement the operations of creation, insertion, deletion on stack data structure

CO-3: Implement the operations of creation, insertion, deletion on queue data structure

CO-4: Apply the operations of creation, insertion, deletion on non-linear data structures

CO-5: Develop the applications using data structure concepts

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	2	2	1	1	1	-	1	2	2	1	1	1	2
CO-2	1	2	1	-	2	-	1	-	1	2	2	-	2	2
CO-3	1	1	1	-	2	-	1	-	1	2	2	-	2	2
CO-4	1	2	2	-	1	-	-	1	1	1	2	-	2	2
CO-5	2	2	2	2	2	1	2	1	-	2	2	1	3	2

UNIT-I:

File I/O – Basic concepts, text files and binary files, file input / output operations, C programming examples.

Data Structures: Introduction to data structures, abstract data types. Asymptotic notations,

Searching Techniques: -linear search, Binary search,

Sorting Techniques: - Bubble sort, Selection Sort, Merge sort, Quick Sort

UNIT-II:

Linked List: Singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation

Double linked list implementation, insertion, deletion and searching operations.

UNIT-III:
Stacks: Operations, array and linked representations of stacks, stack applications- infix to postfix conversion, postfix expression evaluation,

UNIT-IV:
Queues: operations, array and linked representations of queues. Circular queue operations, dequeue operations.

UNIT-V:
Trees: Definitions, binary tree representation, binary search tree, binary tree traversals- Preorder, In order, Post order.
Graphs: Definitions, graph representations, spanning tree, graph traversals- BFS and DFS.

TEXT BOOKS:
1. C Programming & Data Structures, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Cengage Learning
2. Data Structures Using C, Aaron M. Tenenbaum, Pearson Education

REFERENCES:
1. C & Data Structures, P. Padmanabham, 3rd Edition, B. S. Publications
2. Data Structures using C, A. M. Tanenbaum, Y. Langsam, and M. J. Augenstein, Pearson Education
3. C Programming & Data Structures, E. Balagurusamy, TMH
4. C Programming & Data Structures, P. Dey, M. Ghosh, R. Thereja, Oxford University Press
5. C & Data Structures, E. V. Prasad and N. B. Venkateswarlu, S. Chand

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES1AE101) FUNDAMENTALS OF ENGINEERING MECHANICS

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 learn the basic principles of engineering mechanics concepts to analyze the forces and moment systems for equilibrium
- To learn the concepts of friction
- To understand the importance of centroid, centre of gravity (mass)
- To compute the area moment of inertia and mass moment of inertia of standard and composite sections
- To learn the kinematics and kinetics acting on bodies

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: Solve problems of bodies subjected to friction
CO-3: Determine centroid and centre of gravity
CO-4: Determine moment of inertia of a given section
CO-5: Solve problems associated with kinematics and kinetics

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	3	2	3	2	1	-	-	3	3	-	3	3	-
CO-2	3	3	2	3	2	1	-	-	3	3	-	3	3	-
CO-3	3	3	2	3	2	1	-	-	3	3	-	3	3	-
CO-4	3	3	2	3	2	1	-	-	3	3	-	3	3	-
CO-5	3	3	2	3	2	1	-	-	3	3	-	3	3	-

UNIT-I:
Introduction to Mechanics: Classification of Engineering Mechanics-Definitions-Classification of force system-Fundamental Laws of Mechanics-Lami's Theorem-Resolution and components of a force-Resolution of several concurrent forces-Equilibrium of a particle-Equilibrant-Equations of Equilibrium-Free body diagram-Moment of a force about a point-Varignon's theorem-Moment of a couple-Resolution of a force into a force and a couple-Coplanar Parallel force system.

UNIT-II:
Friction: Types of Friction-Laws of friction-Definitions: Coefficient of friction-Angle of friction-Angle of repose- Equilibrium of bodies on rough horizontal and inclined planes-Equilibrium of connected bodies on rough horizontal and inclined planes.

UNIT-III:

Centroid & Centre of Gravity: Introduction - Centroid - Centroid of lines- Standard area – Centroid of composite sections - Centre of gravity of bodies -theorems of pappus-guldinus.

UNIT-IV:

Area Moment of Inertia: Introduction-Second Moment of area-Radius of gyration-Parallel axis thereom-Perpendicular axis theorem- Polar moment of inertia- Moments of inertia of standard sections and composite sections.

Mass Moment of Inertia: Moment of Inertia of Masses – Transfer Formula for Mass moments of inertia – Mass moment of Inertia of bodies (rectangular plate, circular plate, uniform rod, cone)

UNIT-V:

Kinematics of Particles: Introduction-Equations of motion in a straight line under uniform acceleration-Rectilinear motion under variable acceleration-Projectiles-Terms used with the projectiles-Motion of body projected horizontally- Motion of body projected at an angle on level ground.

Kinetics of Particles: Newton's Second Law- D Alembert's Principle and its applications in plane motion and connected bodies including pulleys.

TEXT BOOKS:

1. Engineering Mechanics, S. Timoshenko, D. H. Young & J. V. Rao, 5th Edition, TMH Publishers, 2016
2. A Text Book of Engineering Mechanics, R. K. Bansal, 6th Edition, Laxmi Publications, 2013
3. Engineering Mechanics-Statics and Dynamics, Rajasekaran S. and Sankara Subramanian G., Vikas Publishing House, 2006

REFERENCES:

1. Engineering Mechanics, J. L. Meriam & L. G. Kraige, 7th Edition, John Wiley, 2012
2. Engineering Mechanics, R. C. Hibbeler, 12th Edition, Pearson Education, 2018
3. Engineering Mechanics, A. K. Tayal, 14th Edition, Umesh Publications, 2012
4. Engineering Mechanics, R. K. Rajput, 2nd Edition, Laxmi Publications, 2013
5. Singer's Engineering Mechanics, K. Vijaya Kumar Reddy & J. Suresh Kumar, 3rd Edition, B. S. Publishers, 2011

ONLINE RESOURCES:

1. https://www.youtube.com/playlist?list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs
2. https://www.youtube.com/watch?v=6nguX-cEsvw&list=PLB85BDFBE784BFEB6&index=1&t=3129s

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES1EE103) FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To get awareness of different network theorems used for analysis of electrical circuits
- To understand the basic operation of control circuits used for vehicles
- To know about working of different electrical machines used for propulsion of
- vehicles
- To know the basic operation of semiconductor devices used for automobiles

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyse the given electrical circuits using different network theorems and circuit reduction techniques
CO-2: Understand the operation and applications of transformers
CO-3: Assess the performance of electrical machines used for propulsion of vehicles
CO-4: Understand the operation of various semiconductor devices used in vehicles

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	1	2	2	2	2	2	1	2	1	2	3	2	3
CO-2	2	1	2	2	2	2	2	1	2	1	2	3	2	3
CO-3	2	1	2	2	2	2	2	1	2	1	2	3	3	3
CO-4	2	1	1	2	2	1	2	1	2	1	2	3	1	2

UNIT-I:
Electrical Circuits: Circuit Concept R-L-C Parameters-Ohm's Law - Kirchhoff's Laws - Series - Parallel resistive networks. AC Circuits: Average value, rms value, form factor of sinusoidal function, analysis of series R-L, R-C and R-L-C circuits-simple problems

UNIT-II:
DC Machines: Principle of operation of DC Generator – emf equation – types, DC Motor -principle- types –torque equation – Speed Control-simple problems

UNIT-III:
AC Machines-I: Principle of operation of single phase transformer–emf equation–losses– OC and SC tests - efficiency and regulation (simple Problems),

UNIT-IV:
AC Machines-II: Principle of operation of induction motor – slip –torque characteristics, Principle of operation of alternator – regulation by synchronous impedance method

UNIT-V:

Fundamentals of Electronics: P-N junction diode-symbol-V-I Characteristics-Applications, SCR characteristics and applications, LED, Introduction to BJT, CE Characteristics, Logic gates-truth tables

TEXT BOOKS:

1. Electronic Devices and Circuits, David A. Bell, 5th Edition, Oxford University Press, 2008
2. Introduction to Electrical Engineering, M. S. Naidu and S. Kamakshaiah, TMH Publications, 2017
3. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 11th Edition, Pearson/Prentice Hall, 2016

REFERENCES:

1. Principles of Electrical and Electronics Engineering, V. K. Mehta, S. Chand & Co,2010
2. Basic Electrical Engineering, Kothari and Nagarath, 4th Edition, TMH Publications,2019
3. Basic Electrical Engineering, T. K. Nagasarkar and M. S. Sukhija, 3rd Edition, Oxford University Press, 2017
4. Electrical & Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES3ME101) ENGINEERING GRAPHICS

TEACHING SCHEME		
L	T/P	C
0	4	2

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

COURSE OBJECTIVES:

- To know the importance of engineering scales and curves
- To learn to use the orthographic projections for points, lines and planes in different positions
- To learn to draw the projections of solids and its sections in different positions
- To learn to draw the development of surfaces and intersection of solids
- To learn to draw the isometric projections of solids

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

CO-1: Apply the concepts of scales and engineering curves in construction using AutoCAD

CO-2: Solve the problem of projections of points, lines and planes in different positions using AutoCAD

CO-3: Draw the orthographic projections of solids and its sections in different positions using AutoCAD

CO-4: Obtain the development of surfaces of solids and intersection of solids using AutoCAD

CO-5: Construct the isometric projections of solids using AutoCAD

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	2	1	3	-	-	-	3	2	2	-	3	1
CO-2	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-3	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-4	3	2	2	1	3	-	-	-	3	2	2	-	3	1
CO-5	3	2	2	1	3	-	-	-	3	2	2	-	3	1

Introduction to AutoCAD Software:

User interface, Menu System, Toolbars (Draw, Modify, Dimension, Layers), Setting drawing area, Status Bar (ortho, grid, snap, osnap, iso, lineweight etc.), Display control commands (pan, zoom etc.), Print setup.

UNIT-I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Conventions, Drawing instruments.

Engineering Curves
Conic Sections: Ellipse, Parabola and Hyperbola- General methods only, Rectangular Hyperbola
Cycloidal Curves & Involutes: Cycloid, Epicycloid, Hypocycloid and Involutes
Scales: Plain, Diagonal and Vernier Scales

UNIT-II:
Orthographic Projections: Principles of Orthographic Projections, Conventions, Projections of Points in all positions; Projections of lines and planes inclined to both the planes - Auxiliary Views

UNIT-III:
Projections of Regular Solids: Projections of regular Solids like Prism, Cylinder, Pyramid and Cone inclined to both the Planes - Auxiliary Views
Sections of Solids: Section and sectional views of right regular solids like Prism, Cylinder, Pyramid and Cone – Auxiliary Views

UNIT-IV:
Development of Surfaces of Right Regular Solids: Development of surfaces of Right Regular Solids like Prism, Pyramid, Cylinder and Cone
Intersection of Solids: Intersection of prism vs prism, cylinder vs cylinder

UNIT-V:
Isometric Projections: Principles of isometric projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of lines, Planes and Solids like Prism, Pyramid, Cylinder and Cone
Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, 53rd Edition, Charotar Publishing House, 2016
2. Textbook on Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers, 2010
3. Engineering Drawing and Computer Graphics, M. B. Shah & B. C. Rana, Pearson Education, 2010

REFERENCES:

1. Engineering Drawing and Graphics using AutoCAD, T. Jeyapoovan, 3rd Edition, S. Chand
2. Engineering Drawing, Basant Agrawal and C. M. Agrawal, 3rd Editon, McGraw-Hill
3. Mastering AutoCAD 2021 and AutoCAD LT 2021, George Omura and Brian C. Benton (AutoCAD 2021), 1st Edition, John Wiley & Sons

ONLINE RESOURCES:
1. https://nptel.ac.in/courses/112103019
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php

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

(22ES2IT102) DATA STRUCTURES THROUGH C 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 impart the implementation of data structures such as linked lists, stacks and queue
- To introduce the various advanced data structures such as tree traversals
- To analyze the sorting algorithms
- To teach the various graph traversal algorithms

COURSE OUTCOMES: After completion of the course, the students should be able to
CO-1: Analyze the algorithms to determine the time and space complexities
CO-2: Implement the linear data structures like linked lists
CO-3: Implement the linear data structures like stacks, queues
CO-4: Evaluate the non-linear data structures like Trees and graphs
CO-5: Predict the tree and graph traversing techniques

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	2	3	-	1	2	-	1	-	1	-	1	1	1
CO-2	1	2	1	1	2	1	-	-	-	2	2	-	2	1
CO-3	1	1	1	1	2	1	-	-	-	2	2	-	2	1
CO-4	1	2	2	-	1	-	-	-	1	1	2	-	1	1
CO-5	2	1	2	1	2	-	-	-	-	1	1	1	2	1

LIST OF PROGRAMS:

WEEK 1:
1. File I/O programs

WEEK 2:
2. Searching &Sorting Techniques

WEEK 3:
3. SLL creation, insertion, deletion, searching, display operations.

WEEK 4:
4. CLL creation, insertion, deletion, searching, display operations.

WEEK 5:
5. DLL creation, insertion, deletion, searching, display operations.

WEEK 6:
6. STACK operations using arrays and Linked List.

WEEK 7:
7. Infix to postfix conversion.

WEEK 8:
8. Postfix evaluation.

WEEK 9:
9. QUEUE operations using arrays and Linked List.

WEEK 10:
10. CIRCULAR QUEUE operations using arrays.

WEEK 11:
11. DEQUEUE operations using arrays.

WEEK 12:
12. Binary tree traversals using recursion.

WEEK 13:
13. Graph traversals (BFS and DFS).

TEXT BOOKS:

1. C Programming & Data Structures, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Cengage Learning
2. Data Structures Using C (Paperback), Aaron M. Tenenbaum, Pearson Education

REFERENCES:

1. C & Data Structures, P. Padmanabham, 3rd Editions, B. S. Publications
2. Data Structures using C, A. M. Tanenbaum, Y. Langsam and M. J. Augenstein, Pearson Education
3. C Programming & Data Structures, E. Balagurusamy, TMH
4. C Programming & Data Structures, P. Dey, M. Ghosh, R. Thereja, Oxford University Press
5. C & Data Structures, E. V. Prasad and N. B. Venkateswarlu, S. Chand

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. II Semester

(22ES2EE103) FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING 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 performance of DC shunt machine
- To understand the performance of AC machines
- To understand the performance and efficiency / regulation of electrical machines are determined experimentally
- To understand the operation of solid state devices like diode, transistor and SCR

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

CO-1: Find the application of electrical machines with the experimental determination of the performance of the machines

CO-2: Find the application of Induction motor with the experimental determination of the performance of the machines

CO-3: Find the application of single phase transformer

CO-4: Identify the characteristics of all solid state devices

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	1	2	2	2	2	2	1	2	1	2	3	2	3
CO-2	2	1	2	2	2	2	2	1	2	1	2	3	2	3
CO-3	2	1	2	2	2	2	2	1	2	1	2	3	3	3
CO-4	2	1	1	2	2	1	2	1	2	1	2	3	1	2

SECTION A:

ELECTRICAL ENGINEERING:

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on DC shunt machine. (Predetermination of efficiency of a given DC shunt machine working as motor and generator)
2. Speed Control of DC shunt motor
3. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
4. Brake test on 3-phase induction motor (Determination of performance characteristics)
5. Regulation of alternator by synchronous impedance method

SECTION B:

ELECTRONICS ENGINEERING:

The following experiments are required to be conducted as compulsory experiments:

1. P-n Diode characteristics
2. Transistor CE characteristics (Input and Output)
3. Verification of truth tables by logic gates.
4. CE amplifiers
5. SCR characteristics

TEXT BOOKS:

1. Basic Electrical Engineering, D.P. Kothari and I. J. Nagrath, 4th Edition, Tata McGraw-Hill, 2019
2. Basic Electrical Engineering, MS Naidu and S Kamakshaiah, 2nd Edition, Tata McGraw-Hill, 2008
3. Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019

REFERENCES:

1. Basic Electrical Engineering, P. Ramana, M. Suryakalavathi, G. T. Chandrasheker, 2nd Edition, S. Chand, 2019
2. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill, 2009
3. Basic Electrical and Electronics Engineering, M. S. Sukhija, T. K. Nagsarkar, 1st Edition, Oxford, 2012
4. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, 2nd Edition, McGraw-Hill, 2021
5. Fundamentals of Electrical Engineering, L. S. Bobrow, Oxford University Press, 2011

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