DEPARTMENT OF

COMPUTER SCIENCE AND ENGINEERING (DS,CYS,AIDS)

VISION OF THE DEPARTMENT

- To produce engineers with in-depth technical knowledge and ethical values.
- To incorporate ingeniousness and self-driven capabilities to the students in the fields of mezzanine technologies.
- To nurture the ecosystem of Innovation, Research and Development through an integrated teaching-learning environment for faculty and students.

MISSION OF THE DEPARTMENT

- Offer diverse curriculum in line with industry, professional and research bodies.
- Provide project-based learning environment for developing diverse practical capabilities.
- Offer advanced trainings to enable process skills and competencies.

B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

PROGRAM EDUCATIONAL OBJECTIVES

PEO-I: Enable the students to accomplish professional career in business, government, or academia, with the ability to create creative solutions utilising technology as a tool to address pressing issues. (Professional accomplishment)

PEO-II: Conduct research talents in cutting-edge technologies will add to a new corpus of knowledge. (Continuing Education)

PEO-III: Develop a learning mind-set to continuously improve their knowledge, through on the job, formal and informal learning opportunities. (Attitudes)

PEO-IV: build ethical ability and good leadership, management, teamwork, and communication abilities.

B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

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. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

PROGRAM SPECIFIC OUTCOMES

PSO-1: Apply the principles of artificial intelligence and data science that require problem-solving, inference, perception, knowledge representation, and learning.

PSO-2: Exhibit strong professional skills to function effectively in multi-disciplinary and heterogeneous teams with a growth mind-set to deliver a quality product for Business, Education & Training and E-governance.

PSO-3: Provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Artificial Intelligence and Data science with ethical values.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. I YEAR
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

I SEMESTER **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT101	Matrices and Calculus	3	1	0	4	4
22BS1PH102	Applied Physics	3	0	0	3	3
22ES1CS101	Programming for Problem Solving	3	0	0	3	3
22HS1EN101	English for Skill Enhancement	2	0	0	2	2
22ES1DS101	Introduction to Data Science	2	0	0	2	2
22ES3ME102	Engineering Drawing	0	0	4	4	2
22HS2EN101	English Language and Communication Skills Laboratory	0	0	2	2	1
22BS2PH102	Applied Physics Laboratory	0	0	2	2	1
22ES2CS101	Programming for Problem Solving Laboratory	0	0	2	2	1
22SD5CS101	Elements of Computer Science and Engineering	0	0	2	2	1
22MN6HS101	Induction Programme	2	0	0	2	0
Total		**15**	**1**	**12**	**28**	**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
22BS1MT103	Statistical Methods for Data Analysis	3	0	0	3	3
22ES1CS102	Data Structures	3	0	0	3	3
22BS1CH102	Chemistry For Engineers	3	0	0	3	3
22ES1EE101	Basic Electrical and Electronics Engineering	3	0	0	3	3
22BS2CH101	Engineering Chemistry Laboratory	0	0	2	2	1
22ES2EE101	Basic Electrical and Electronics Engineering Laboratory	0	0	2	2	1
22ES2CS102	Data Structures Laboratory	0	0	2	2	1
22ES2ME102	Engineering and IT Workshop	0	0	4	4	2
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, Tata McGraw Hill, New Delhi,11th Reprint, 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

(22BS1PH102) APPLIED 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 the principles of quantum physics and band theory of solids
- To explain various types of semiconductors and semiconductor devices
- To study the fundamental concepts related to the dielectric and magnetic materials
- 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: Apply quantum mechanics to behavior of a particle and classify solids based on band gap

CO-3: Identify the role of semiconductor devices in science and engineering applications.

CO-4: Illustrate applications of dielectric, magnetic 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	PSO-3
CO-1	3	2	1	1	-	1	1	-	1	1	-	1	-	-	-
CO-2	3	2	1	-	1	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:

Quantum Physics and Band Theory of Solids:

Quantum Physics: Introduction to quantum physics-Planck's law, Wave-particle duality, de-Broglie hypothesis, Matter waves, Davisson and Germer experiment – Heisenberg uncertainty principle and its applications - Born interpretation of the wave function – Time independent Schrodinger wave equation - Particle in one dimensional infinite potential well.

Band Theory Solids: Free electron theory (Drude& Lorentz.)-Electrical Conductivity- Verification of Ohm's law -Bloch's theorem -Kronig-Penney model (qualitative) – E-k diagram, Effective mass of electron -Origin of energy bands- Classification of solids.

UNIT-III:

Semiconductors and Devices:

Semiconductors: Intrinsic Semiconductors-Intrinsic carrier concentration, Extrinsic semiconductors (Qualitative), Fermi level and its temperature dependence, Hall effect-Hall coefficient, Applications of Hall effect.

Semiconductor Devices: Direct and indirect band gap semiconductors-Formation and characteristics of P-N junction diode, construction, working principle, Characteristics and applications of LED, and Solar cell, Construction and working principle of Laser diode.

UNIT-IV:

Dielectric and Magnetic Materials:

Dielectric Materials: Basic definitions- Types of polarizations (qualitative) -Frequency dependence of polarization, Local field, Clausius-Mossotti relation, Ferroelectric, Piezoelectric, and Pyroelectric materials – Applications.

Magnetic Materials: Basic definitions- Types of Magnetic materials, Antiferro and ferri magnetic materials, Weiss-Domain theory of ferromagnetism, Hysteresis - Soft and hard magnetic materials, Multiferroics – Applications.

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, CRC Press, Taylor & Francis Group Energy Materials, 1st Edition, Taylor & Francis Group, 2022

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES1CS101) PROGRAMMING FOR PROBLEM SOLVING

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: Illustrate the flowchart, algorithm, pseudo code for a given problem

CO-2: Execute programs using various data types and operators

CO-3: Implement programs using conditional and iterative statements for a given problem

CO-4: Exercise on programs using arrays, pointers, dynamic memory management, structures and unions

CO-5: Develop solution for a given problem using modular approach and perform file handling

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

UNIT - I:

Introduction to Programming:

Compilers, compiling and executing a program.

Representation of Algorithm, Flowchart/ Pseudocode with examples, Program design and structure of C programming.

Variables, Data types Operators, expressions and precedence, Expression evaluation, Storage classes, type conversion.

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Conditional Branching: Branching with if, if-else, nested if-else, else-if ladder, switch-case, goto,

UNIT - II:

Loops, Arrays, Strings:

Loops: Iteration with for, while, do- while loops, break and continue statements.

Arrays: One and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, string functions available in C arrays of strings.

UNIT – III:

Searching, Sorting, Functions:

Searching: Basic searching in an array of elements (linear and binary search techniques)

Sorting: Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value. Recursion with examples. Some C standard functions and libraries.

UNIT-IV:

Structures and Pointers:

Structures: Defining structures, initializing structures, unions, Array of structures,

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Passing arrays to functions and structures to functions. Dynamic memory allocation, self-referential structures

UNIT - V:

Preprocessor Directives and File Handling in C:

Preprocessor Directives: Symbolic constants, macro expansion and file inclusion.

User Defined Data Types: enum, typedef

Files: Text and Binary files, file input/output operations, Error Handling in Files, random access of files, command line arguments.

TEXT BOOKS:

1. The C Programming Language , Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. C Programming and Data Structures, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Cengage Learning
3. C: The Complete Reference, Herbert Schildt, Mc Graw Hill, 4th Edition

REFERENCES:

1. Problem Solving and Program Design in C, Jeri R. Hanly and Elliot B. Koffman, 7th Edition, Pearson
2. Computer Fundamentals and C, E. Balagurusamy, 2nd Edition, McGraw-Hill
3. Let us C, Yashavant Kanetkar, 18th Edition, BPB
4. How to Solve it by Computer, R. G. Dromey, 16th Impression, Pearson
5. Programming in C, Stephen G. Kochan, 4th Edition, Pearson Education

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/106105171
2. https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/307

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

(22ES1DS101) INTRODUCTION TO DATA SCIENCE

TEACHING SCHEME		
L	T/P	C
2	0	2

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

COURSE OBJECTIVES:

- To analyze the various probability distributions
- To make statistical inferences about data
- To provide advanced statistical background for analyzing data and drawing inferences from the analysis
- To mathematically characterize optimal solutions for nonlinear optimization models
- To analyze Principle Component Analysis

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

CO-1: Understand Data Science and basics of Various Distributions

CO-2: Calculate and interpret descriptive statistics appropriately

CO-3: Understand and apply the basic mathematical and statistical concepts in data science

CO-4: Optimize the available data using certain optimization techniques

CO-5: Able to simplify the complexity in high-dimensional data while retaining trends and patterns

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

UNIT-I:

What is Data Science? Three pillars of data science, Types of Data, Cumulative Distribution Function, Normal Distribution, Standard Normal Distribution, Empirical Rule, and Related Problems, Assessing Normality, Binomial Distribution, Poisson Distribution, Uniform distribution

UNIT-II:

Exponential distribution, lognormal distribution, Central limit theorem, K-S Test for similarity of two distributions, power law and pareto distribution, box-cox transform, Interpretation of Chebyshev's inequality.

UNIT-III:
Descriptive statistics, Inference statistics, Measures of Central Tendency, kurtosis, skewness, Matrices, solving linear equations, fields, vector spaces, linear independence, basis and advantages of rank, null space, rank nullity theorem, linear transformation, norms, inner products, orthogonality, orthonormal basis.

UNIT-IV:
Fundamentals of optimization, components of optimization problem, types of optimization problems, univariate optimization and related numerical examples, multivariate optimization and related numerical examples.

UNIT-V:
Why learn PCA, Geometric intuition of PCA, Eigen values and Eigen vectors, visualizing MNIST dataset, Limitations of PCA, PCA code example, PCA for dimensionality reduction.

TEXT BOOKS:

1. Probability and Mathematical Statistics, Prasanna Sahoo, 2008
2. Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Cambridge University Press, 2008
3. Linear Algebra and Optimization for Machine Learning, Charu C. Aggarwal, Springer

REFERENCES:

1. Computational and Inferential Thinking: The Foundations of Data Science, Adi Adhikari and John De Nero, 1st Edition, 2019
2. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
3. Mathematical Foundations of Data Science Using R, Matthias Dehmer, Salissou Moutari, Frank Emmert-Streib, De Gruyter Oldenbourg, 2020
4. Probability and Statistics for Data Science: Math + R + Data, Norman Matloff, CRC Data Science Series, 2019

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22ES3ME102) ENGINEERING DRAWING

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 understand the importance of engineering curves
- To learn to use the orthographic projections for points, lines and planes
- To Understand the Projections of Solids in different positions
- To learn the importance of Isometric Projections and its conversions

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Apply the concepts of engineering curves and its construction using AutoCAD
CO-2: Solve the problems of projections of points, lines and planes in different positions using AutoCAD
CO-3: Solve the problems of Projections of Solids using AutoCAD
CO-4: Solve the problems on Conversion of Isometric views to Orthographic Views & Orthographic to Isometric Views 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	-	-	-
CO-2	3	2	2	1	3	-	-	-	3	2	2	-	-	-
CO-3	3	2	2	1	3	-	-	-	3	2	2	-	-	-
CO-4	3	2	2	1	3	-	-	-	3	2	2	-	-	-

Introduction to AutoCAD Software:
The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line, The Status Bar, Different methods of zoom as used in CAD, Select and erase objects

UNIT-I:
Introduction to Engineering Drawing: Principles of Engineering drawing and their significance and Conventions
Engineering Curves: Construction of Ellipse, Parabola and Hyperbola – General and Special methods; Cycloidal curves- Epicycloids and Hypocycloids

UNIT-II:
Orthographic Projections, Projections of Points & Straight Lines: Principles of Orthographic Projections – Conventions; Projections of Points in all positions; Projections of lines inclined to both the planes

UNIT-III:
Projections of Planes: Projections of Planes- Surface Inclined to both the Planes

UNIT-IV:
Projections of Regular Solids: Projections of Regular Solids inclined to both the Planes – Prisms, Pyramids, Cylinder and Cone

UNIT-V:
Isometric Projections: Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and Compound Solids 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. Mastering AutoCAD 2021 and AutoCAD LT 2021, George Omura and Brian C Benton (AutoCAD 2021), 1st Edition, John Wiley & Sons

ONLINE RESOURCES:
1. https://www.classcentral.com/course/swayam-engineering-graphics-5305
2. https://www.mooc-list.com/tags/engineering-drawing

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

(22BS2PH102) APPLIED 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	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	-	-	-

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 energy gap of a semiconductor
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. Applied 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

(22ES2CS101) PROGRAMMING FOR PROBLEM SOLVING 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 will 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: Execute the programs using derived and user defined data types
CO-4: Implement programs using modular approach and file I/O
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
CO-1	2	2	3	2	1	-	-	-	2	2	-	2	-	-
CO-2	2	2	3	2	1	1	-	-	2	2	-	2	-	-
CO-3	1	2	3	1	1	1	-	-	2	2	2	2	-	-
CO-4	1	2	3	1	1	1	-	-	2	2	2	2	-	-
CO-5	2	2	2	2	1	1	-	-	2	2	2	2	-	-

LIST OF PROGRAMS:

WEEK 1:

a. Programs on input, output statements
b. Programs on various operators
c. Programs on expression evaluation

WEEK 2:

a. Program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

b. Programs on conditional statements- Simple if, if-else, Nested if-else, Else-if ladder, switch case

WEEK 3:

a. Programs on simple loops- while, for, do. while
b. Programs on Nested loops- while, for, do. while
c. Programs to understand goto, break, continue

WEEK 4:

a. Programs on 1-D arrays
b. Programs on linear, binary searching
c. Programs on bubble, selection and insertion sorting

WEEK 5:

a. Programs on 1-D strings
b. Programs using string handling functions

WEEK 6:

a. Programs on 2-D arrays
b. Programs on 2-D strings

WEEK 7:

a. Programs on user defined functions
b. Programs on passing arrays and strings to functions

WEEK 8: Internal Lab Exam -1

WEEK 9:

a. Programs on recursion
b. Programs on structures – simple structure, array of structures, array within structure, nested structure
c. Programs on Unions

WEEK 10:

Programs on pointers to variables

a. Programs on pointers to arrays(1-D, 2-D)

WEEK 11:

a. Program to understand call by value and call by address
b. Programs on pointers to strings
c. Programs on pointers to structure
d. Programs using malloc, calloc , realloc, free

WEEK 12:

a. Programs on macros, file inclusion, enum , typedef
b. Programs on sequential file accessing

WEEK 13:

a. Programs on error handling functions in files
b. Programs on Random file accessing

c. Programs on command line arguments

WEEK 14: Lab Internal Exam -2

TEXT BOOKS:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India
2. C Programming and Data Structures, B. A. Forouzan and R. F. Gilberg, 3rd Edition, Cengage Learning
3. C: The Complete Reference, Herbert Schildt, 4th Edition, McGraw Hill

REFERENCES:

1. Problem Solving and Program Design in C, Jeri R. Hanly and Elliot B. Koffman, 7th Edition, Pearson
2. Computer Fundamentals and C, E. Balagurusamy, 2nd Edition, McGraw-Hill
3. Let us C, Yashavant Kanetkar, 18th Edition, BPB
4. How to Solve it by Computer, R. G. Dromey, Pearson, 16th Impression
5. Programming in C, Stephen G. Kochan, 4th Edition, Pearson Education

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/106105171
2. https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/307

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. I Semester

(22SD5CS101) ELEMENTS OF COMPUTER SCIENCE AND 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 OBJECTIVE:

- To study/demonstrate the concepts of computer with respect to it's hardware
- To identify the importance of software engineering principles and software process framework
- To introduce Operating Systems, Data Base Management concepts and to give the description of structure of Data Base systems
- To configure a network and build the web pages using HTML, CSS, XML
- To learn Autonomous systems and the need of Artificial Intelligence

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze the working principles of functional units of a basic Computer
CO-2: Understand program development, the use of data structures and algorithms in problem solving
CO-3: Know the need and types of operating system, database systems
CO-4: Apply the significance of networks, internet, and WWW and cyber security
CO-5: Investigate the Autonomous systems and application of Artificial Intelligence

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

LIST OF EXERCISES:

WEEK 1: Identify the different components of Computer
WEEK 2: Demonstrate the assembling and disassembling of Hardware
WEEK 3: Usage of PowerPoint, Word, and Excel sheet
WEEK 4: Design and understand the need of Flowcharts and Algorithms
WEEK 5: Demonstrate the installation and features of Windows
WEEK 6: Demonstrate the installation and features of LINUX Operating Systems
WEEK 7: Understand & Implement the DDL
WEEK 8: Understand & Implement the DML commands
WEEK 9: Analyse the IP Address, LAN Setting and Network Crimping.
WEEK 10: Usage of Basic Networking commands

WEEK 11: Create Web pages using basic tags of HTML, XML & CSS.
WEEK 12: Case Study: Design a sample Student webpage using basic tags of HTML, XML & CSS.
WEEK 13: Implement Image and Video Processing Tools
WEEK 14: Internal Lab Exam

TEXT BOOKS:
1. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.
2. Elements of Computer Science, Cengage

REFERENCES:
1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press
2. Introduction to Computers, Peter Norton, 8th Edition, Tata McGraw Hill
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010

ONLINE RESOURCES:
1. https://onlinecourses.swayam2.ac.in/cec19_cs06/preview
2. https://onlinecourses.swayam2.ac.in/nou20_cs03/preview