GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 25
COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
I YEAR I SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
INDUCTION PROGRAM										
THEORY										
MA101BS	Matrices and Calculus	BSC	Foundation	3	1	0	4	40	60	100
ME102ES	Computer Aided Engineering Drawing	ESC	Foundation	2	0	2	3	40	60	100
PH103BS	Advanced Engineering Physics	BSC	Foundation	3	0	0	3	40	60	100
CS104ES	Programming for Problem Solving	ESC	Foundation	3	0	0	3	40	60	100
EE105ES	Basic Electrical Engineering	ESC	Foundation	3	0	0	3	40	60	100
PRACTICAL										
EE106ES	Basic Electrical Engineering Lab	ESC	Foundation	0	0	2	1	40	60	100
PH107BS	Advanced Engineering Physics Lab	BSC	Foundation	0	0	2	1	40	60	100
CS108ES	Programming for Problem Solving Lab	ESC	Foundation	0	0	2	1	40	60	100
CS109ES	IT Workshop	ESC	Foundation	0	0	2	1	40	60	100
			Total Credits	**14**	**1**	**10**	**20**			

COURSE CONTENT

MATRICES AND CALCULUS								
I Year - I Semester: ECE, CSE, CSE (AI & ML), CSE (Data Science), CE & ME								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
MA101BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: Mathematical Knowledge at the pre-university level								

1. COURSE OVERVIEW

This course Matrices and Calculus is a foundation course of mathematics for all engineering branches. The concepts of Matrices, Eigen Values, Eigen Vectors, Functions of Single and Several Variables, Curve Tracing and Multiple Integrals. This course is applicable for simulations, colour imaging processes, and finding optimal solutions in all fields of industries.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Types of matrices and their properties.
2) The concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3) Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form.
4) A geometrical approach to the mean value theorems and their application to the mathematical problems.
5) Evaluation of surface areas and volumes of revolutions of curves.
6) A basic idea of tracing geometrical figure of an algebraic equation.
7) Partial differentiation, the concept of total derivative.
8) Finding maxima and minima of a function of two and three variables.
9) Evaluation of multiple integrals and their applications.

3. COURSE OUTCOMES

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

CO 1	Find rank of a matrix by Echelon and Normal Form. Write the matrix representation of a set of linear equations and analyse the solution of the system of equations.
CO 2	Find the Eigen Values and Eigenvectors. Reduce the quadratic form to canonical form using orthogonal transformations. To do verification and Application of Cayley Hamilton Theorem.
CO 3	Solve the applications on the mean value theorems. Expand a function using Taylors Series. Trace a basic geometrical figure of a given curve.
CO 4	Find the extreme values of functions of two variables with / without constraints and to apply Lagrange's Multipliers.
CO 5	Evaluate the multiple integrals, change the order and apply the concept to find areas, volumes.

4. COURSE CONTENT

UNIT - I: Matrices **8 L**

Rank of a matrix by Echelon form and Normal form – Inverse of Non-singular matrices by Gauss-Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method.

UNIT - II: Eigen values and Eigen vectors **10 L**

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

UNIT - III: Single Variable Calculus **10 L**

Limit and Continuous of functions and its properties. Mean value theorems: Rolle 's Theorem – Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem – Taylor's Series (All the theorems without proof).

Curve Tracing: Curve tracing in cartesian coordinates. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates).

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications) **10 L**

Definitions of Limit and continuity – Partial Differentiation: Euler's Theorem – Total derivative – Jacobian – Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) **8 L**

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form) – Change of variables for double integrals (Cartesian to polar). Evaluation of Triple Integrals – Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates). Applications: Areas by double integrals and volumes by triple integrals.

5. TEXT BOOKS

1) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2) R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

6. REFERENCE BOOKS

1) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3) N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications,
4) Reprint, 2008.
5) H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

CO-PO-PSO Mapping

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

COURSE CONTENT

COMPUTER AIDED ENGINEERING DRAWING								
I Year - I Semester: Common to CSE (AIML), CSE (DS) and ECE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
ME102ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		2	**-**	**2**	**3**	**40**	**60**	**100**
Contact Classes: 32	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 64**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course offers a comprehensive foundation in Engineering Drawing, blending conventional drawing techniques with computer-aided design tools. It begins with the principles of geometrical constructions, scales, and conic sections, progressing to orthographic projections of points, lines, and planes. Students will explore projections and sectional views of regular solids, along with the development of their surfaces. The curriculum culminates in mastering isometric projections and the conversion between isometric and orthographic views. Emphasis is placed on both manual drafting skills and digital proficiency to prepare students for modern engineering design challenges.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To develop a strong foundation in geometrical constructions, scales, and curves including conic sections and cycloidal paths, essential for precise technical drawing.
2) To develop a strong foundation in geometrical constructions, scales, and curves including conic sections and cycloidal paths, essential for precise technical drawing.
3) To train students in creating accurate projections and sectional views of regular solids, enhancing spatial understanding and CAD proficiency.
4) To impart skills in unfolding 3D objects into 2D layouts, facilitating fabrication and design of engineering components.
5) To equip students with the ability to construct and interpret isometric views and convert between isometric and orthographic projections for comprehensive design communication.

3. COURSE OUTCOMES

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

CO 1	Construct precise geometrical figures and curves such as conic sections and cycloidal paths using conventional drafting techniques
CO 2	Generate accurate orthographic projections of points, lines, and planes using both manual methods and computer-aided drafting tools.
CO 3	Visualize and represent regular solids through sectional and auxiliary views, enhancing their spatial reasoning and CAD proficiency
CO 4	Develop the surfaces of 3D solids like prisms, cylinders, pyramids, and cones to support fabrication and design applications.
CO 5	Create and interpret isometric views of objects and convert between isometric and orthographic projections for effective technical communication.

4. COURSE CONTENT

UNIT – I: Introduction to Engineering Graphics (Conventional)
Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

UNIT – II: Orthographic Projections (Conventional and Computer Aided)
Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections, points, lines and planes. Introduction to Computer aided drafting, views, commands and conics.

UNIT - III: Projections of Regular Solids (Conventional and Computer Aided)
Auxiliary Views, Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, Auxiliary views, Computer aided projections of solids, sectional views.

UNIT - IV: Development of Surfaces (Conventional)
Prism, Cylinder, Pyramid and Cone.

UNIT - V: Isometric Projections (Conventional and Computer Aided)
Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids, Isometric Projection of objects having non, isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions. Conversion of orthographic projection into isometric view.

Note:
1. The End Semester Examination will be in conventional mode.
2. CIE – I will be in conventional mode.
3. CIE – II will be using Computer.

5. TEXT BOOKS

1) Engineering Drawing, N. D. Bhatt, Charotar, 54th Edition, 2023.
2) Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3rdEdition,2010.

6. REFERENCE BOOKS

1) Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2) Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rdEdition, 2020.
3) Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.
4) Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5) Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edition, 2015.

CO-PO-PSO Mapping

	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**	**3**		**3**							**1**	**2**	**1**
CO 2	**3**	**3**	**3**	**2**	**3**								**3**	**1**
CO 3	**3**	**3**	**3**		**3**								**2**	**3**
CO 4	**3**	**3**	**3**		**3**								**3**	**3**
CO 5	**3**	**3**	**3**	**3**	**3**	**1**				**3**		**1**	**3**	**3**

COURSE CONTENT

ADVANCED ENGINEERING PHYSICS								
I Year - I Semester: CE, ME, ECE, CSE(AIML), CSE(DS) **I Year - II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
PH103BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: 10+2								

1. COURSE OVERVIEW

This course provides engineering students with a foundational understanding of key physics concepts relevant to advanced materials, quantum mechanics, modern technologies, and engineering applications. It bridges theory and practical knowledge crucial for material characterization, quantum computing, magnetic and dielectric properties, and photonic technologies.

2. COURSE OBJECTIVE

The students will try to Learn:

1) The crystal structures, defects, and material characterization techniques like XRD and SEM.
2) The fundamental concepts of quantum mechanics and their applications in solids and nanomaterials.
3) The quantum computing principles, quantum gates, and basic quantum algorithms.
4) The properties and applications of magnetic and dielectric materials.
5) To explore the working and applications of lasers and fibre optics in modern technology.

3. COURSE OUTCOMES

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

CO 1	Analyse crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.
CO 2	Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids
CO 3	Understand quantum computing concepts, use quantum gates, and explain basic quantum algorithms.
CO 4	Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.
CO 5	Explain the principles of lasers and fibre optics and their applications in communication and sensing.

4. COURSE CONTENT

UNIT – I:

Crystallography & Materials Characterization: Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. concept of nanomaterials: surface to volume ratio, X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT – II:

Quantum Mechanics : Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.

UNIT - III:

Quantum Computing: Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch-Jozsa, Shor, Grover.

UNIT - IV:

Magnetic and Dielectric Materials: Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device. Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT - V:

Laser and Fibre Optics: Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle. Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

5. TEXT BOOKS

1) Walter Borchardt-Ott, Crystallography: An Introduction, Springer.
2) Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc.
3) Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove

6. REFERENCE BOOKS

1) Jozef Gruska, Quantum Computing, McGraw Hill
2) Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
3) John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited.

CO-PO-PSO Mapping

	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**	**2**	**2**							**3**	**3**	**2**
CO 2	**3**	**3**	**2**	**2**	**2**							**3**	**3**	**3**
CO 3	**3**	**2**	**3**	**2**	**3**							**3**	**3**	**3**
CO 4	**3**	**2**	**2**	**2**	**2**		**2**					**2**	**3**	**2**
CO 5	**3**	**2**	**2**	**3**	**3**		**2**					**3**	**3**	**3**

COURSE CONTENT

PROGRAMMING FOR PROBLEM SOLVING								
I Year - I Semester: CSE (DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS104ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course introduces the fundamental concepts of problem solving using structured programming techniques with the C language. It focuses on developing logical thinking, algorithm design, and translating solutions into efficient C programs. Students will gain hands-on experience in writing, compiling, debugging, and executing C programs while strengthening their analytical and problem-solving skills.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To learn the fundamentals of computers.
2) To understand the various steps in program development.
3) To learn the syntax and semantics of the C programming language.
4) To learn the usage of structured programming approaches in solving problems

3. COURSE OUTCOMES

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

CO 1	Apply control structures in C programs to solve computational problems involving decision making and iterative processes.
CO 2	Develop modular programs using functions and pointers, demonstrating the principles of top-down design and parameter passing.
CO 3	Implement and manipulate arrays and strings in C, including performing searching, sorting, and string operations using library functions.
CO 4	Design recursive solutions for mathematical and programming problems, and use structures and unions to model and manage complex data.
CO 5	Apply file handling techniques in C for text and binary data processing, and implement efficient searching and sorting algorithms.

4. COURSE CONTENT

UNIT - I: (10L)

Overview of C:C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output**.**

Selection Structures: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms.

Repetition and Loop Statements: Repetition in Programs, Counting Loops and the while Statement, Computing a Sum or Product in a Loop, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement.

UNIT - II: **(10L)**

Top-Down Design with Functions: Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Arguments.

Pointers and Modular Programming: Pointers and the Indirection Operator, Functions with Output Parameters, Multiple Calls to a Function with Input/ Output Parameters, Scope of Names, Formal Output Parameters as Actual Arguments.

UNIT - III: **(10L)**

Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Searching and Sorting an Array, Parallel Arrays and Enumerated Types, Multidimensional Arrays.

Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of Pointers.

UNIT - IV: **(10L)**

Recursion: The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters

Structure and Union Types: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.

UNIT-V: **(8L)**

Text and Binary File Pointers: Input/ Output Files - Review and Further Study, Binary Files, Searching a Database.

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

5. TEXT BOOKS

1) Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2) B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

6. REFERENCE BOOKS

1) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2) E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
3) Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
4) R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
5) Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6) Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

CO-PO-PSO Mapping

	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**	**2**	**1**									
CO 2	**3**	**3**	**2**	**2**	**2**									
CO 3	**3**	**3**	**2**	**2**	**2**									
CO 4	**3**	**3**	**3**	**2**	**2**									
CO 5	**3**	**3**	**2**	**2**	**2**									

COURSE CONTENT

BASIC ELECTRICAL ENGINEERING								
I Year - I Semester: CSE (DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EE105ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

This course provides fundamental knowledge of electricity, circuit laws, and electrical machinery, serving as a core subject for many engineering branches

2. COURSE OBJECTIVE

The students will try to Learn:

1) To understand DC and Single & Three phase AC circuits.
2) To study and understand the different types of DC, AC machines and Transformers.
3) To import the knowledge of various electrical installations and the concept of power, power factor and its improvement.

3. COURSE OUTCOMES

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

CO 1	Understand and analyze basic Electrical circuits
CO 2	Study the working principles of Electrical Machines and Transformers
CO 3	Introduce components of Low Voltage Electrical Installations

4. COURSE CONTENT

UNIT – I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time domain analysis of first-order RL and RC circuits.

UNIT – II:

AC. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - III:

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT - IV:

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT - V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

5. TEXT BOOKS

1) D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2) MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008

6. REFERENCE BOOKS

1) P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3) M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4) Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

7. ELECTRONIC RESOURCES

1) **https://nptel.ac.in/courses/108108076**

CO-PO-PSO Mapping

	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**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**
CO 2	**3**	**3**	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**
CO 3	**3**	**3**	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**

COURSE CONTENT

BASIC ELECTRICAL ENGINEERING LABORATORY								
I Year - I Semester: CSE (DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EE106ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides hands-on experience with electrical circuit components, measuring instruments like multimeters and oscilloscopes, and electrical machines.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
2) To study the transient response of various R, L and C circuits using different excitations.
3) To determine the performance of different types of DC, AC machines and Transformers.

3. COURSE OUTCOMES

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

CO 1	Verify the basic Electrical circuits through different experiments.
CO 2	Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
CO 3	Analyze the transient responses of R, L and C circuits for different input conditions.

4. LIST OF EXPERIMENTS/DEMONSTRATIONS:

PART- A (compulsory)

1) Verification of KVL and KCL
2) Verification of Thevenin's and Norton's theorem
3) Transient Response of Series RL and RC circuits for DC excitation
4) Resonance in series RLC circuit
5) Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7) Performance Characteristics of a DC Shunt Motor
8) Torque-Speed Characteristics of a Three-phase Induction Motor.

PART- B (any two experiments from the given list)

1) Verification of Superposition theorem.
2) Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
3) Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4) Measurement of Active and Reactive Power in a balanced Three-phase circuit
5) No-Load Characteristics of a Three-phase Alternator

5. TEXT BOOKS

1) Lab manual

6. MATERIALS ONLINE:

1) Course template
2) Lab manual

CO-PO-PSO Mapping

	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**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO 2	**3**	**3**	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**
CO 3	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**

COURSE CONTENT

ADVANCED ENGINEERING PHYSICS LABORATORY								
I Year - I Semester: CE, ME, ECE, CSE(AIML), CSE(DS) **I Year - II Semester: CSE**								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
PH107BS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: 10+2								

1. COURSE OVERVIEW

This lab course is designed for first-year B.Tech. students providing practical exposure to key concepts in advanced and modern physics through hands-on experiments. This course equips students with essential lab skills in material synthesis, characterization, and advanced technology measurements, supporting their theoretical learning with applicable experimental techniques.

2. COURSE OBJECTIVE

The students will try to Learn:

1) The Practical exposure to advanced concepts in solid-state and modern physics.
2) The synthesize and study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.
3) The Perform semiconductor characterization using Hall effect and band gap experiments.
4) To explore the working principles of lasers and optical fibers through hands-on experiments.
5) To develop skills in data analysis, interpretation, and scientific reporting.

3. COURSE OUTCOMES

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

CO 1	Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.
CO 2	Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
CO 3	Characterize semiconductors using Hall effect and energy gap measurement techniques.
CO 4	Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
CO 5	Apply scientific methods for accurate data collection, analysis, and technical report writing.

4. LIST OF EXPERIMENTS:

1) Synthesis of magnetite (Fe3O4) powder using sol-gel method.
2) Determination of energy gap of a semiconductor.
3) Determination of Hall coefficient and carrier concertation of a given semiconductor.
4) Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
5) Study of B-H curve of a ferro magnetic material.
6) Determination of work function and Planck's constant using photoelectric effect.
7) Determination of dielectric constant of a given material.
8) V-I and L-I characteristics of light emitting diode (LED)
9)
   a) Determination of wavelength of a laser using diffraction grating.
   b) Study of V-I & L-I characteristics of a given laser diode.

10)

a) Determination of numerical aperture of a given optical fibre.
b) Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed

5. REFERENCE BOOK

1) S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

CO-PO-PSO Mapping

	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**	**2**	**2**							**3**	**3**	**2**
CO 2	**3**	**3**	**2**	**2**	**2**							**3**	**3**	**3**
CO 3	**3**	**3**	**2**	**3**	**3**							**3**	**3**	**3**
CO 4	**3**	**2**	**3**	**2**	**3**							**3**	**3**	**3**
CO 5	**2**	**2**	**2**	**3**	**2**							**3**	**2**	**3**

COURSE CONTENT

PROGRAMMING FOR PROBLEM SOLVING LAB								
I Year - I Semester: CSE (DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS108ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The Programming for Problem Solving Laboratory focuses on foundational programming skills using C. Students learn to create, debug, and execute programs using an IDE, addressing various numeric and algorithmic problems. The course emphasizes the use of arrays, pointers, functions, and file operations to develop modular and efficient code. It also covers string manipulations, sorting, and searching algorithms. The lab sessions provide practical experience in problem-solving and code optimization.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To learn the fundamentals of computers.
2) To understand the various steps in program development.
3) To learn the syntax and semantics of the C programming language.
4) To learn the usage of structured programming approaches in solving problems.

3. COURSE OUTCOMES

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

CO 1	Develop and debug C programs using an IDE.
CO 2	Solve basic numeric and algorithmic problems with C.
CO 3	Implement and manage arrays, pointers, and functions in C.
CO 4	Handle file operations in C for reading, writing, and processing.
CO 5	Perform string manipulations and various sorting/searching algorithms.

4. LIST OF EXPERIMENTS:

1) Simple numeric problems:

a) Write a program for finding the max and min from the three numbers.
b) Write the program for the simple, compound interest.
c) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15
d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

2) **Expression Evaluation:**
   a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).
   b) Write a program that finds if a given number is a prime number.
   c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
   d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

3) **Arrays, Pointers and Functions:**
   a) Write a C program to find the minimum, maximum and average in an array of integers.
   b) Write a C program that uses functions to perform the following:
      i. Addition of Two Matrices
      ii. Multiplication of Two Matrices
   c) Write a program for reading elements using a pointer into an array and display the values using the array.
   d) Write a program for display values reverse order from an array using a pointer.

4) **Files:**
   a) Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
   b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

5) **Strings:**
   a) Write a C program that uses functions to perform the following operations:
      i. To insert a sub-string into a given main string from a given position.
      ii. To delete n Characters from a given position in a given string
   b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
   c) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
   d) Write a C program to count the lines, words and characters in a given text.

6) **Sorting and Searching:**
   a) Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
   b) Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
   c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
   d) Write a C program that sorts the given array of integers using selection sort in descending order
   e) Write a C program that sorts the given array of integers using insertion sort in ascending order
   f) Write a C program that sorts a given array of names.

5. TEXT BOOKS

1) Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2) B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

6. REFERENCE BOOKS

1) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2) E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3) Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4) R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5) Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6) Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

CO-PO-PSO Mapping

	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**				**2**	**2**		**2**		
CO 2	**3**	**3**	**2**	**2**	**2**					**2**		**2**		
CO 3	**3**	**3**	**2**	**2**	**2**				**2**			**2**		
CO 4	**3**	**2**	**2**		**2**							**2**		
CO 5	**3**	**3**	**2**	**2**	**3**							**2**		

COURSE CONTENT

IT WORKSHOP								
I Year – I Semester: CSE(DS)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CS109ES	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The IT Workshop course is designed to provide students with foundational knowledge and practical skills in Information Technology. The course introduces essential IT tools, concepts, and practices used in both academic and professional environments. Students will gain hands-on experience in working with computer hardware, operating systems, basic networking, office productivity software, and internet tools.

2. COURSE OBJECTIVE

The students will try to Learn:

1) The IT Workshop for engineers include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

3. COURSE OUTCOMES

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

CO 1	Perform Hardware troubleshooting
CO 2	Understand Hardware components and inter dependencies
CO 3	Safeguard computer systems from viruses/worms
CO 4	Document/ Presentation preparation
CO 5	Perform calculations using spreadsheets

4. COURSE CONTENT

PC Hardware

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

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

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

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

Internet & World Wide Web

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

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

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

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

LaTeX and WORD

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

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

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

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

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

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

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

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

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

PowerPoint

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

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

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

5. REFERENCE BOOK

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

CO-PO-PSO Mapping

	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**	**2**	**3**				**2**			**2**		
CO 2	**3**	**2**	**2**	**2**	**2**							**2**		
CO 3	**2**	**2**			**2**	**2**		**2**				**2**		
CO 4	**2**				**3**				**2**	**3**	**2**	**2**		
CO 5	**3**	**2**			**3**					**2**	**2**	**2**		