FACULTY OF ENGINEERING

Scheme of Instruction & Examination

For

Four Year Degree Programme of

Bachelor of Engineering (B.E)

in

Computer Science and Engineering

(Accredited by NBA)

(With effect from the academic year 2025-26)

Empower Women - Impact the World

Estd. 2008

STANLEY COLLEGE OF ENGINEERING AND TECHNOLOGY FOR WOMEN (AUTONOMOUS)

(Affiliated to Osmania University)

(Accredited by NAAC with "A" Grade)

ABIDS, HYDERABAD-500001, TELANGANA

Vision of the Institute

Empowering girl students through professional education integrated with values and character to make an impact in the world.

Mission of the Institute

- Providing quality engineering education for girl students to make them competent and confident to succeed in professional practice and advanced learning.
- Establish state-of-art-facilities and resources to facilitate world class education.
- Integrating qualities like humanity, social values, ethics, leadership in order to encourage contribution to society.

Vision of the Department

Empowering girl students with the contemporary knowledge in computer science engineering for their success in life.

Mission of the Department

- To impart quality education for girl students to learn and practice various hardware and software platforms prevalent in industry.
- To achieve self-sustainability and overall development through Research and Development activities.
- To provide education for life by focusing on the inculcation of human & moral values through an honest and scientific approach.
- To groom students with good attitude, team work and personality skills.

Knowledge and Attitude Profile (WK)

WK1. A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2. Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3. A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4. Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5. Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6. Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7. Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8. Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9. Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Department of Computer Science and Engineering

Program Outcomes (POs)

PO1. **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2. **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3. **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4. **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5. **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6. **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7. **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8. **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9. **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10. **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11. **Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Educational Objectives (PEOs)

PEO1. Graduates shall have enhanced skills and contemporary knowledge in software and hardware technologies for professional excellence, towards successful employment, advanced learning and research.

PEO2. Graduates shall have life-long learning attitude, innovation and creativity to master latest technologies, devise solutions for realistic and social issues in the society.

PEO3. Graduates shall have good attitude and personality skills, ethical values, teamwork and leadership skill towards professionalism and ethical practices within the organization and the society.

Program Specific Outcomes (PSOs)

PSO1. Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for the benefit of students.

PSO2. Design, Implement, Test and Evaluate a computer system, component or algorithm to meet desired needs and to solve a computational problem.

Abbreviation	Meaning
HS	Humanities, Social Sciences and Management
BS	Basic Sciences including Mathematics, Physics and Chemistry
ES	Engineering Sciences including Workshop, Drawing, Basic Electrical / Electronics
PC	Professional Core Subjects
PE	Professional Elective Subjects
OE	Open Elective Subjects
PW	Project Work, Seminars, Internship
MC	Mandatory Courses
AC	Audit Courses
PY	Philosophy
EC	Electronics and Communication Engineering.
CE	Civil Engineering,
MP	Mechanical / Production Engineering
IT	Information Technology
CS	Computer Science Engineering
EE	Electrical and Electronics Engineering
CM	Computer Engineering
AD	Artificial Intelligence and Data Science
L	Lecture
T	Tutorial
P	Practical
G	Grade
D	Drawing
CIE	Continuous Internal Evaluation
SEE	Semester End Evaluation
	Each contact hour is a clock hour
	The duration of the Practical class is two hours; however, it can be extended wherever necessary, to enable the student to complete the experiment.

Induction Program

SMC901CS Induction Program (Mandatory)	3 weeks' duration
Induction program for students to be offered right at the start of the first year	• Physical Activity • Creative Arts • Universal Human Values-I • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

CSE: SEMESTER - I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hours/ Week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	S25BS101MT	Linear Algebra & Calculus	3	1	-	4	40	60	3	4
2	S25BS901CH	Engineering Chemistry	3	1	-	4	40	60	3	4
3	S25ES101CS	Programming for Problem Solving	3	-	-	3	40	60	3	3
4	S25HS901EG	English	2	-	-	2	40	60	3	2
5	S25HS902EG	Universal Human Values	2	-	-	2	40	60	3	2
Practical/ Laboratory Courses										
6	S25BS911CH	Engineering Chemistry Lab	-	-	2	2	40	60	3	1
7	S25ES111CS	Programming for Problem Solving Lab using C	-	-	4	4	40	60	3	2
8	S25HS911EG	English Lab	-	-	2	2	40	60	3	1
9	S25ES911ME	Engineering Graphics Lab	-	-	4	4	40	60	3	2
10	S25ES112CS	IT Workshop (Skill Development)	-	-	2	2	40	60	3	1
Total			**13**	**02**	**14**	**29**	**400**	**600**	**30**	**22**

CSE: SEMESTER – II

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	S25BS202PH	Applied Physics	3	1	-	4	40	60	3	4
2	S25BS203MT	Probability, Statistics and Number Systems	3	1	-	4	40	60	3	4
3	S25ES901CS	Data Structures	3	1	-	4	40	60	3	4
4	S25ES202EE	Basic Electrical and Electronics Engineering	3	1	-	4	40	60	3	4
Practical/ Laboratory Courses										
5	S25BS212PH	Applied Physics Lab	-	-	2	2	40	60	3	1
6	S25ES911CS	Data Structures Lab	-	-	4	4	40	60	3	2
7	S25ES912ME	Engineering Workshop	-	-	4	4	40	60	3	2
8	S25PW911CS	Design Thinking and IDEA Lab	-	-	2	2	50	-	-	1
Total			**12**	**04**	**12**	**28**	**330**	**420**	**21**	**22**

CSE: SEMESTER – III

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hrs	
Theory Courses										
1	S25BS305MT	Differential Equations, Numerical Methods and Vector Calculus	4	-	-	4	40	60	3	4
2	S25PC301CS	Object Oriented Programming using Java	3	1	-	4	40	60	3	4
3	S25ES301EC	Fundamentals of Electronics Engineering	3	-	-	3	40	60	3	3
4	S25PC302CS	Computer Organization & Microprocessor	3	-	-	3	40	60	3	3
5	S25ES902CS	Python Programming	3	-	-	3	40	60	3	3
Practical/ Laboratory Courses										
6	S25PC311CS	Object Oriented Programming using Java Lab	-	-	2	2	40	60	3	1
7	S25ES312EC	Electronics Lab	-	-	2	2	40	60	3	1
8	S25ES912CS	Python Programming Lab	-	-	2	2	40	60	3	1
Total			**16**	**01**	**6**	**23**	**320**	**480**	**24**	**20**

CSE: SEMESTER – IV

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/ D	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hrs	
Theory Courses										
1	S25PC401CS	Mathematical Foundations for Computer Science	3	-	-	3	40	60	3	3
2	S25PC402CS	Theory of Computation	3	-	-	3	40	60	3	3
3	S25PC403CS	Database Management Systems	3	-	-	4	40	60	3	3
4	S25HS901BM	Managerial Economics & Financial Accountancy	3	-	-	3	40	60	3	3
5	S25PC404CS	Operating Systems	3	-	-	3	40	60	3	3
6	S25MC902CH	Environmental Sciences	2	-	-	2	40	60	3	0
Practical/ Laboratory Course										
7	S25PC411CS	Database Management Systems Lab	-	-	2	2	40	60	3	1
8	S25PC412CS	Operating Systems Lab	-	-	2	2	40	60	3	1
9	S25PC413CS	Web Technologies Lab	-	3	2	2	40	60	3	4
10	S25PW912CS	Internship-1	The students have to undergo an Internship of 4-week duration after IV-Semester SEE				-	-	-	-
Total			**17**	**03**	**06**	**24**	**360**	**540**	**27**	**21**

CSE: SEMESTER – V

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hrs	
Theory Courses										
1	S25PC501CS	Machine Learning	3	1	-	3	40	60	3	4
2	S25PC502CS	Computer Networks	3	-	-	3	40	60	3	3
3	S25PC503CS	Design and Analysis of Algorithms	3	1	-	3	40	60	3	4
4	S25PC504CS	Software Engineering	3	-	-	3	40	60	3	3
5	S25PE50XCS	Professional Elective-I	3	-	-	3	40	60	3	3
6	S25MC901XX	Indian Constitution	2	-	-	2	40	60	3	0
Practical/Laboratory Courses										
7	S25PC511CS	Computer Networks Lab	-	-	2	2	40	60	3	1
8	S25PC512CS	Design and Analysis of Algorithms Lab	-	-	2	2	40	60	3	1
9	S25PC513CS	Software Engineering Lab	-	-	2	2	40	60	3	1
10	S25HS912EG	Advanced Communication Skills Lab	-	-	2	2	40	60	3	1
11	S25PW912CS	Internship-1	The students have to undergo an Internship of 4-week duration after IV-Semester SEE				50	-	-	1
Total			**17**	**02**	**08**	**25**	**450**	**600**	**30**	**22**

CSE: SEMESTER – VI

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hrs	
Theory Courses										
1	S25PC601CS	Artificial Intelligence	3	-	-	3	40	60	3	3
2	S25PC602CS	Information Security	3	-	-	3	40	60	3	3
3	S25PC603CS	Compiler Design	3	-	-	3	40	60	3	3
4	S25OE90XXX	Open Elective-I	3	-	-	3	40	60	3	3
5	S25PE60XCS	Professional Elective –II	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC611CS	Artificial Intelligence Lab	-	-	2	2	40	60	3	1
7	S25PC612CS	Information Security Lab	-	-	2	2	40	60	3	1
8	S25PC613CS	Compiler Design Lab	-	-	2	2	40	60	3	1
9	S25PW913CS	Technical Seminar	-	-	2	2	50	-	-	1
	S25PW914CS	Mini Project	-	-	2	2	50	-	-	1
10	S25PW915CS	Internship -2	The students have to undergo an Internship of 4-week duration after VI- Semester SEE				-	-	-	-
Total			**15**	**-**	**10**	**25**	**420**	**480**	**24**	**20**

CSE: SEMESTER – VII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hrs	
Theory Courses										
1	S25PC701CS	Full Stack Development	3	-	-	3	40	60	3	3
2	S25PE70XCS	Professional Elective- III	3	-	-	3	40	60	3	3
3	S25PE70XCS	Professional Elective – IV	3	-	-	3	40	60	3	3
4	S25PE70XCS	Professional Elective – V	3	-	-	3	40	60	3	3
5	S25OE90XXX	Open Elective-II	3	-	-	3	40	60	3	3
Practical/ Laboratory Courses										
6	S25PC711CS	Full Stack Development Lab	-	-	2	2	40	60	3	1
7	S25PE71XCS	Professional Elective- III Lab	-	-	2	2	40	60	3	1
8	S25PW916CS	Project Work – I	-	-	6	6	50	-	-	3
9	S25PW915CS	Internship -2	The students have to undergo an Internship of 4-week duration after VI-Semester SEE				50	-	-	2
Total			**15**	**-**	**10**	**25**	**380**	**420**	**21**	**22**

CSE: SEMESTER – VIII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	SEE Duration In Hrs	
Theory Courses										
1	S25OE90XXX	Open Elective – III	3	-	-	3	40	60	3	3
Practical/ Laboratory Courses										
2	S25PW917CS	Project Work – II	-	-	16	16	50	100	3	8
Total			**03**	**-**	**16**	**19**	**90**	**160**	**6**	**11**

Professional Elective-I

Course Code	Course Name
S25PE501CS	Mathematics for Machine Learning
S25PE502CS	Distributed Systems
S25PE503CS	Image Processing
S25PE504CS	Real-Time Systems
S25PE505CS	Information Retrieval

Professional Elective-II

Course Code	Course Name
S25PE601CS	Cloud Computing
S25PE602CS	Web 3.0 and Decentralized Applications
S25PE603CS	Programming for Quantum Computers
S25PE604CS	Digital Image Watermarking
S25PE605CS	Edge Computing

Professional Elective-III (Theory)

Course Code	Course Name
S25PE701CS	Deep Learning
S25PE702CS	Big Data Analytics
S25PE703CS	Amazon Web Services
S25PE704CS	Software Testing and Automation
S25PE705CS	Cloud-Native Application Development

Professional Elective-III (Lab)

Course Code	Course Name
S25PE711CS	Deep Learning Lab
S25PE712CS	Big Data Analytics Lab
S25PE713CS	Amazon Web Services Lab
S25PE714CS	Software Testing and Automation Lab
S25PE715CS	Cloud-Native Application Development Lab

Professional Elective-IV

Course Code	Course Name
S25PE706CS	Blockchain Technology
S25PE707CS	Microservices and API Management
S25PE708CS	Agile Product Development
S25PE709CS	Game Development Fundamentals
S25PE70ACS	Human-Centered Computing

Professional Elective-V

Course Code	Course Name
S25PE70BCS	Natural Language Processing
S25PE70CCS	Reinforcement Learning
S25PE70DCS	Explainable AI
S25PE70ECS	Software Reliability and Maintenance
S25PE70FCS	AI in Law and Policy

Open Electives Offered to ECE/EEE

Course Code	Course Name
S25OE901CS	Object Oriented Programming with Java
S25OE902CS	Database Management Systems
S25OE903CS	Operating Systems
S25OE904CS	Software Engineering
S25OE905CS	Computer Networks
S25OE906CS	Cloud Computing
S25OE907CS	Data Science Using R

CSE I Semester Syllabus

CSE: SEMESTER - I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hours/ Week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	S25BS101MT	Linear Algebra & Calculus	3	1	-	4	40	60	3	4
2	S25BS901CH	Engineering Chemistry	3	1	-	4	40	60	3	4
3	S25ES101CS	Programming for Problem Solving	3	-	-	3	40	60	3	3
4	S25HS901EG	English	2	-	-	2	40	60	3	2
5	S25HS902EG	Universal Human Values	2	-	-	2	40	60	3	2
Practical/ Laboratory Courses										
6	S25BS911CH	Engineering Chemistry Lab	-	-	2	2	40	60	3	1
7	S25ES111CS	Programming for Problem Solving Lab using C	-	-	4	4	40	60	3	2
8	S25HS911EG	English Lab	-	-	2	2	40	60	3	1
9	S25ES911ME	Engineering Graphics Lab	-	-	4	4	40	60	3	2
10	S25ES112CS	IT Workshop (Skill Development)	-	-	2	2	40	60	3	1
Total			**13**	**02**	**14**	**29**	**400**	**600**	**30**	**22**

Course Code	Course Title						Core/Elective
S25BS101MT	Linear Algebra & Calculus (Common to All)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Basics of Matrices, differentiation and integration.	3	1	–	-	40	60	4

Course Objectives

1. To provide a solid foundation in linear algebra concepts
2. To develop the ability to apply differential and multivariable calculus techniques for problem solving
3. To introduce the concept of multiple integrals.

Course Outcomes

1. Recall fundamental definitions, formulas, and standard methods in linear algebra, differential calculus, multivariable calculus, and integration.
2. Understand the fundamental concepts of matrices, eigenvalues and eigenvectors, differential calculus, multivariable functions, and multiple integrals relevant to engineering applications.
3. Apply appropriate mathematical techniques such as matrix operations, eigen analysis, differential calculus, multivariable functions, and integration methods to solve related problems.
4. Analyze mathematical problems to select and compare appropriate techniques from linear algebra and calculus for effective problem-solving
5. Evaluate different mathematical techniques in linear algebra and calculus based on their accuracy, efficiency, and suitability for solving given problems

Unit-I

Matrices: Rank of a matrix by Echelon form and Normal form. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations, LU Decomposition method and Gauss Seidel Iteration Method. Linear dependence and linear independence of vectors, basis and dimension.(T2&T3)

Unit-II

Eigen values and Eigen vectors: Eigen values, Eigen vectors and properties. Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to Canonical forms by Orthogonal Transformation.(T1&T3)

Unit-III

Differential Calculus: Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean Value Theorem (without proofs), Taylor's series, Curvature, Radius of curvature, Circle of Curvature and Evolute. (T1&T3)

Unit-IV

Multivariable Calculus (Differentiation): Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum for functions of two variables, Method of Lagrange Multipliers.(T1&T2)

Unit-V

Multiple Integrals (Integration): Double and Triple integrals (Cartesian), Change of order of integration (Cartesian coordinates), and Change of variables (double integrals). Beta and Gamma Functions, Relation between Gamma and Beta Functions.(T1 & T3)

TEXT BOOKS:

T1. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 43dEdition, 2014.
T2. Jain & Iyenga, Advanced Engineering Mathematics, 5th Edition, Narosa Publications.
T3. B.V. Ramana, Engineering Mathematics, Tata McGraw Hill .

REFERENCES/SUGGESTED READING:

R1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 9* Edition 2012.
R2. N. Bali, M. Goyal, A text book of Engineering Mathematics, Laxmi Publications,2010.

Course Code	Course Title						Core/Elective
S25BS901CH	Engineering Chemistry						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
--	3	1	–	-	40	60	4

Course Objectives

1. Apply the principles of electro chemistry in storage of electrical energy in Batteries.
2. Gains knowledge about the causes of Corrosion and its prevention and attains Knowledge about the hard water and treatment of water for drinking purpose.
3. Correlate the properties of polymeric materials with their internal structure and use for engineering applications.
4. Exposed to qualitative and quantitative parameters of chemical fuels.
5. Expose the techniques regarding spectroscopy and familiarizes Nano materials including Green chemistry.

Course Outcomes:

Student will be able to:

1. Apply the concept of electrode potential in identifying feasibility of electro chemical reaction: illustrate electro analytical techniques and working of batteries.
2. Identify the mechanism of corrosion of materials on basis of electro chemical approach and devise corrosion control methods. Water Chemistry enables understanding the causes effects of hardness.
3. Analyze the preparation, properties and applications of polymeric materials.
4. Classify chemical fuels and grade them through qualitative analysis.
5. Understanding the Spectroscopic techniques and examples of clean technology.

UNIT - I: (10Hrs) ELECTROCHEMISTRY&BATTERIES

Electrochemistry: Concept of Electrode Potential, SEP, SOP, SRP, Electrochemical series. Electrochemical cells: Electrolytic cells and Galvanic cells, Cell representation. Types of electrodes: Calomel electrode, Quinhydrone Electrode. Determination of pH of a solution by using Quinhydrone electrode. Nernst equation and its derivation. Applications of Nernst equation. Numerical problems.

Battery chemistry:

Types of Batteries: Primary batteries: Zinc-Carbon Battery, Secondary Batteries: Lead-Acid battery, Lithium Ion batteries, and their application.

Fuel cells: Concept of fuel cells, Construction, Working and Advantages of $CH_3OH – O_2$ fuel cell

UNIT - II: (10 Hrs) WATERCHEMISTRY & CORROSION

Water Chemistry: Hardness of water, types of hardness, units of hardness, Determination of temporary, permanent &total hardness by EDTA method, Numerical. WatersofteningbyionexchangeandReverseOsmosismethods.Specificationofpotable water. Sterilization bychlorination.

Corrosion:

Causes and effects of corrosion, Chemical (dry) corrosion, Electrochemical (wet) corrosion-Mechanisms. Types of Electrochemical corrosion (Galvanic corrosion, Pitting Corrosion, Water line corrosion) Factors affecting the rate of Corrosion –Corrosion control methods-Cathodicprotection: Sacrificial Anode method and Impressedcurrent method.

UNIT - III: (10Hrs) ENGINEERING MATERIALS

Polymers: Basicterms: Monomer, Polymer, Polymerization, Functionality, And Degree of polymerization. Nomenclature of Polymers. Types of Polymerization (Addition, Condensation, CoPolymerization).Thermosetting and Thermoplastic Resins. Preparation, Properties and Applications- **Plastics**: PET and Bakelite **Elastomers**: Buna-SRubber. **Fibers:** Kevlar

Biodegradable polymers: Introduction- Preparation, Properties and Applications of PolyLactic Acid.

Conducting polymers: Introduction, classification. Mechanism of conduction in Poly Acetylene. Applications of conducting polymers

UNIT IV: (10 Hrs.)CHEMICALFUELS

Chemical fuels: Introduction- Definition and classification of Chemical fuels-Primary and Secondaryfuels. Requirements of good fuel. Calorific value --HCV, LCV. Theoretical calculation of calorific value by Dulong's formula- Numericals.

Solid fuels: Coal-Ranking of Coal, Analysis of Coal: Proximateanalysis, Ultimate analysis and significance.

Liquid fuels: Source –Fractional distillation of petroleum, important fractions, and their uses.

Gaseous fuels: LPG, CNG composition and uses. Green Hydrogen – Sourcing of Green Hydrogen.

Biodiesel: Sources of Biodiesel, Synthesis of Biodiesel (Transesterification) – Applications of Biodiesel

UNIT – V: (10 Hrs) SPECTROSCOPY, NANO MATERIALS, GREEN CHEMISTRY.

Spectroscopy: Introduction of Spectroscopy, Principles and Applications of UV-Visible Spectroscopy, IR Spectroscopy,^{1}H-NMR Spectroscopy.

Nano Materials: Introduction-Definition, Synthesis of Nano materials by using Sol-Gel method and Precipitation method. Industrial applications of Nano materials.

Green Chemistry: Concept, Principles of Green Chemistry, Examples of Green Chemistry.

Text Books:

1. P. C. Jain and M. Jain, Engineering Chemistry, Dhanapathi Rai publishing
2. Text Book of Engineering Chemistry buShashi Chawla
3. Chemistry in Engineering and Technology by Kuriacose & Rajaram.
4. Engineering chemistry by B Shivashankar
5. Text Book of Engineering Chemistry by Dr.S.S. Dara, Dr. K.Mukkanti, S.CHAND

Reference Books:

1. PrinciplesofPhysicalChemistrybyPuri,SharmaandPathaniaS.N.Chand&Co.NewDelhi(Latest edition).
2. Engineering Chemistry by O G Palanna, TMH, and New Delhi.
3. Engineering Chemistry by Prasanta Rath, Cengage Learning India Pvt. Ltd.
4. Engineering Chemistry (NPTEL – web book), by B.L. Tembe, Kamaluddin and M.S. Krishna
5. Concise In organic Chemistry by J.D. Lee, Blackwell publications V Edition
6. Organic chemistry by T.W. Graham Solomons& Craig B.Fryhle, 7th Edition, Wiley Publications.
7. Engineering Physics by Prof. Battacharya, Oxford press
8. Engineering Physics by Gupta & Gupta
9. SC Rastogi, N. Mendiratta, P.Rastogi, Bioinformatics: Methods & Applications: Genomics, Proteomics& Drug Discovery,PHIPublications,2013.

Course Code	Course Title					Core / Elective
S25ES101CS	Programming for Problem Solving					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
Basics of Computers	3	-	-	40	60	3

Course Objectives :

1. Understand the basic structure of computer systems and the fundamentals of problem-solving using algorithms and flowcharts.
2. Develop proficiency in C programming constructs including data types, operators, control statements, arrays, and functions.
3. Apply structures, unions, and enumerations for handling complex data and designing structured programs.
4. Analyse the use of pointers and dynamic memory allocation for efficient program execution.
5. Implement file handling techniques and command-line arguments for building data-driven applications.

Course Outcomes : On completion of this course, the student will be able to:

1. Explain the fundamentals of problem-solving, algorithm development, and C programming constructs such as data types and control structures.
2. Develop modular C programs using arrays, strings, and user-defined functions including recursion and parameter passing.
3. Construct programs using structures and unions for managing heterogeneous data and enabling modular data design.
4. Analyze and implement pointer operations and dynamic memory allocation techniques for efficient memory management.
5. Create programs that perform file operations and handle command-line arguments for real-time applications.

Additional Course Outcomes:

1. Integrate different programming concepts to solve real-world problems using C programming.
2. Evaluate and debug C programs for correctness, performance, and memory efficiency.

UNIT – I

Introduction to Problem-Solving: Computer System, components of a computer system, computing environments, computer languages, creating and running programs, the problem-solving aspect, Algorithms, Implementation of Algorithms, the efficiency and analysis of Algorithms, Flowcharts.

Introduction to C language: Structure of C programs, process of compiling and running of a program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types, Operators and expressions.

Conditional Control structures: Decision statements; Simple if, if-else, else if ladder, Nested if, and Case Statement-switch statement.

Iterative Control structures: Loop control statements: while, for and do while loops. jump statements, break, continue, and goto statements.

UNIT – II
ARRAYS AND FUNCTIONS

Arrays: Concepts, one-dimensional arrays, declaration and initialization of one dimensional arrays.

Searching and Sorting: linear search, binary search, bubble sort. Two dimensional arrays, initialization and accessing, multi-dimensional arrays.

Strings (character arrays): Arrays of characters, variable-length character strings, inputting character strings.

Functions: Need for user defined functions, function declaration, function prototype, category of functions, character library functions, string handling functions, inter function communication, function calls, parameter passing mechanisms, recursion, passing arrays to functions, passing strings to functions, storage classes, preprocessor directive.

UNIT – III
STRUCTURES AND UNIONS

Structures: Structure definition, declaration, initialization, Operations on Structures, Arrays and Structures- Array of Structures, Arrays within Structures, Structure within Structure, Structures and Functions - Passing Structures to Functions as Arguments, Returning a Structure from a Function.

Union: Unions within Structures, Structures within Unions, Arrays within Unions, Enumerated Data Type, typedef.

UNIT – IV
POINTERS AND DYNAMIC MEMORY ALLOCATION

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, pointers and arrays, pointers as function arguments, functions returning pointers, passing structures through pointers, self-referential structures.

Dynamic memory allocation: Basic concepts, library functions.

UNIT – V
FILE HANDLING:

Files: Streams, basic file operations, file types, file opening modes, input and output operations with files, special functions for working with files, file positioning functions, command line arguments.

Case Study: Student Information System

Text Books:

1. Somasekhara, "Problem Solving with C ", PHI,2018.
2. R. G Dromey, "How to Solve it by Computer", Prentice–Hall International Series in Computer Science, 1982.
3. Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw Hill Education, 3rd Edition, 2017.
4. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012.

References:

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHILearning, 2nd Edition, 1988.
2. YashavantKanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003. 3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4thEdition, 2014.
3. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
4. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
5. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

Online Resources

1. https://ekumbh.aicte-india.org/allbook.php#
2. https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3. https://www.udemy.com/course/c-for-technical interview/?couponCode=MT150725G1

Course Code	Course Title						Core / Elective
S25HS901EG	ENGLISH (Common to all Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	-	-	-	**40**	**60**	**2**

Course Objectives:

1. To enhance students' English language proficiency by integrating reading, vocabulary, grammar, and writing skills using rich literary and informational texts.
2. To develop critical thinking, creativity, and effective written communication for academic, professional, and social contexts.

Course Outcomes:

1. Analyze and interpret literary and informational texts to identify themes, tone, and author intent. (Analyze (L4), Understand (L2))
2. Use contextual strategies to build vocabulary and apply word formation techniques in academic and professional tasks. (Apply (L3), Understand (L2))
3. Apply grammatical rules accurately in both written and spoken communication. (Apply L3)
4. Construct coherent and well-organized written pieces including emails, précis, paragraphs, and short essays. (Create (L6), Apply (L3)
5. Respond critically and creatively to themes in texts by using inclusive, clear, and contextually relevant language. (Create (L6), Evaluate (L5))

UNIT-I
Reading: The Need for Excellence - Narayan Murthy
Vocabulary: Word formation - part I - Prefixes, Suffixes, Root words
Grammar: Interchange of parts of speech, Punctuation
Writing: Guided Writing (Expanding the outline / Writing from verbal cues)

UNIT-II
Reading: Still I Rise - Maya Angelou
Vocabulary: Word formation – part II Compounding and Blending
Grammar: Tense and Concord
Writing: Paragraph writing using Connectives, Précis Writing

UNIT-III
Reading: The Silent Crisis (Chapter-1) Martha C. Nussbaum
Vocabulary: Synonyms, Antonyms, One-word substitutes
Grammar: Voice
Writing: Formal Letter Writing and E-mail writing

UNIT-IV
Reading: "The Fringe Benefits of Failure and the Importance of Imagination," by J.K. Rowling
Vocabulary: Words often confused, Phrasal Verbs and Prepositional phrases
Grammar: Narration (Direct - Indirect speech)
Writing: Essay writing (Persuasive and Argumentative)

UNIT-V
Reading: 'Girl' by Jamaica Kincaid
Vocabulary: Inclusive Language, Euphemisms
Grammar: Degrees of Comparison
Writing: Picture Description

Suggested Reading

1. Murphy, Raymond. Grammar in Use, Cambridge University Press
2. Board of Editors. Language and Life: A Skills Approach. Orient BlackSwan, 2018.
3. Sudharshana, NP and C Savitha. English for Engineers. Cambridge University Press, 2018.
4. Kumar, Sanjay and Pushp Lata. English Language and Communication Skills for Engineers. Oxford University Press, 2018.
5. Practical English Usage by Michael Swan, Oxford University Press 4th edition 2017.
6. Kumar, T Vijay, K Durga Bhavani and YL Srinivas. English in Use: A Textbook for College Students. 2nd Edition. Macmillan Education India Private Limited, 2020
7. Kumar, E Suresh, Engineering English, Orient Blackswan, 2015.

Course Code	Course Title						Core/Elective
S25HS902EG	Universal Human Values						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
--	2	-	–	-	40	60	2

Course Objectives:

1. To develop a critical ability to distinguish between essence and form or between what is of value and what is superficial to life.
2. To move from discrimination to commitment. It is to create an ability to act on any discrimination in a given situation.
3. It encourage students to discover what they consider valuable, after learning the course, they should be able to discriminate between valuable and superficial in real situation in their life.

Course Outcomes:

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

1. Identify the essentials of human values and skills. (Knowledge) (Comprehension)
2. Understand between profession and happiness (Knowledge) (Comprehension)
3. Understand practically the importance of trust, mutually satisfying human behaviour. (Knowledge) (Synthesis)
4. Develop and enrich interaction with nature. (Application)
5. Develop appropriate technologies and management patterns to create harmony in professional and personal life. (Synthesis)

SYLLABUS:

UNIT	DETAILS
I	Course introduction- need, basic guidelines, content and process for value education: understanding the need, basic guidelines, content and process for value education. Self-exploration. What is it?-its content and process; 'natural acceptance' and experiential validation as the mechanism for self-exploration. Continuous happiness and prosperity- a look at basic human aspirations. Right understanding, relationship and physical facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding happiness and prosperity correctly, a critical appraisal of current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.
II	Understanding harmony in the human being. Harmony in myself understanding human being as a coexistence of the sentiment I and the material body. Understanding the needs of self and body Sukh and Suvidha. Understanding the body as an instrument of I (being the doer, seer enjoyer) understanding the harmony of I with the body sanyam and swasthya. Correct appraisal of physical needs meaning of prosperity in detail programs to ensure Sanyam and Swasthya.
III	Understanding harmony in the family and society -how many in human, human relationships understanding harmony in the family, and the basic unit of human interaction. Understanding values in human- human relationship; meaning of justice and program for its fulfillment. Trust and respect essay foundational values of relationship. Difference between intention and competence. Difference between respect and differentiation. The other salient values in relationship. Understanding the harmony in the society (society being an extension of family).

IV Understanding harmony the nature of existence: whole existence as coexistence: understanding the harmony in the nature, interconnectedness and mutual fulfillment among the four orders of nature -recyclability and self-regulation in nature.

V Understanding existence as coexistence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence. implications of the above holistic understanding of harmony on professional ethics; natural acceptance of human values, definition Ness of ethical human conduct, basic for humanistic education, humanistic constitution and humanistic universal order.

Suggested Reading

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
3. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain
4. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986
5. Smriti Shristava, "Human Values and Professional Ethics", Katson Publications,2007

Course Code	Course Title						Core/Elective
S25BS911CH	Engineering Chemistry Lab						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
--	-	-	–	2	40	60	1

Course Objectives

1. Conduct experiments, Take measurements and analyze the data through hands on experience
2. Impart fundamental knowledge in handling the equipment / glasswareand chemicals in chemistry laboratory.
3. Apply various instrumental methods to correlation to theory and to improve understanding of theoretical concepts.
4. Interpret the electro analytical principles with experimental results graphically.
5. Demonstrate the writing skills through clear laboratory reports.

Course Outcomes: Students will be able to

1. Determine the Unknown compound in the given sample.(Analysis, Application)
2. Knowing of the hardness and alkalinity of sample water. (Analysis)
3. Measure the amount of a substance in a given solution by Conductometry, Potentiometry andPH metry (Application)
4. Synthesis of Drug Molecules.(Analysis, Application)
5. Verification of colorimetric Principles and Estimation of Unknown compounds (Knowledge)

List of Experiments

a) Introduction to Chemical Analysis

b) Techniques of Weighing

VOLUMETRIC ANALYSIS

PERMANGANOMETRY

1. Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and Estimation of Ferrous ion.

DICHROMETRY

2. Preparation of Standard Mohr's salt solution, Standardization of $K_2Cr_2O_7$ and Estimation of Ferrous ion.

WATER ANALYSIS

3. Preparation of Standard $MgSO_4$ solution, Standardization of EDTA, Estimation of Total hardness of water by EDTA method.

INSTRUMENTAL ANALYSIS

CONDUCTANCE MEASUREMENTS

4. Preparation of Standard Oxalic Acid($H_2C_2O_4$) Solution, Standardization of NaOH, Estimation of Hcl.
5. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of CH_3COOH.
6. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of Hcl and CH3COOH.

POTENTIOMETRIC MEASUREMNETS

7. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of Hcl.
8. Preparation of Standard Mohr's salt solution, Standardization of KMnO4 and Estimation of Ferrous ion.

P^{H} METRY

9. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of Hcl.
10. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of CH_3COOH.

SYNTHESIS OF A DRUG MOLECULE

11. Synthesis of Paracetamal.

COLOROMETRY

12. Verification of Beer's Law and Estimation of the given Copper Sulphate.

Reference Books:

1. Senior Practical Physicla Chemistry, B.D.Khosla, A.Gjulati, V.C.Garg., (R.Chand and company, New Delhi 10th Edition)
2. An Introduction to Practical Chemistry, K.K.Sharma and D.S. Sharma (Viaks Publishing, New Delhi)
3. Experiments in Applied chemistry, Sunita Rattan, S. K Kataria & Soms
4. Quantitative Inorganic chemistry by Vogel

Course Code	Course Title					Core / Elective
S25ES111CS	Programming for Problem Solving using C Lab					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
Basics of Computers	-	-	4	40	60	2

Course Objectives :

1. Identify and apply basic I/O, operators, control structures, and conditional logic to solve simple problems.
2. Develop programs using arrays, searching, sorting, and matrix operations to perform data manipulations.
3. Design modular programs using user-defined functions and recursion to improve code reusability.
4. Apply structures, unions, and string handling functions to model and manage structured data efficiently
5. Implement pointers and file handling techniques to manipulate memory and perform file-based operations.

Course Outcomes : On completion of this course, the student will be able to:

1. Understand the concept of basics of C, data types and variables.
2. Understand the concept of operators, the precedence of operators, and looping statements.
3. Explore the concept of strings, recursive functions, and the differences between call by value and call by reference.
4. Explore the concept of storage classes, preprocessors, directives, pointers, and files.
5. Understand the concept of file-handling functions,, and real-time applications of C.

Additional Course Outcomes:

1. Integrate multiple programming constructs to design and implement complete C programs that solve real-world problems.
2. Debug and evaluate C programs for logical errors, performance issues, and code optimization.

NOTE: The experiments could also practice using other programming languages like C++/ JAVA / PYTHON/ R etc.,

EXP-1: Basic I/O, Operators

a) Implement a program to check and print whether a given number is even or odd using a ternary operator.
b) Implement a program to calculate the area and circumference of a circle.
c) Implement a program to solve a given expression.

EXP-2: Basic I/O, conditional execution, loops, Jump Statement

a) Implement a program to accept a student's roll number and marks, calculate the total and average, and print the grade of the student.
b) Implement a program to print the Fibonacci series.
c) Implement a program to check and print whether a number is an Armstrong number.
d) Implement a program to check and print whether a number is prime.
e) Implement a program to add the sum of only positive integers using a continue statement.

EXP-3: Basic I/O, Conditional execution, loops, Arrays (integer1D, 2D)

a) Implement a program using a 1D array to calculate and print the sum of integers
b) Implement a program to perform binary search on a list of elements.
c) Implement a program to apply the bubble sort technique to sort a list of unsorted elements.
d) Implement a program to perform matrix addition using a 2D array.
e) Implement a program to perform matrix multiplication using a 2D array.

EXP-4: Sub Programs: User Defined Functions, Recursion

a) Implement a program to illustrate the different prototypes of user-defined functions.
b) Implement a program to calculate the factorial of a given number using functions.
c) Implement a program to calculate the factorial of a given number using recursive functions.

EXP-5: Strings

a) Implement a program to determine whether a given string is a palindrome or not.
b) Implement a program to demonstrate the working of various built-in string handling functions.

EXP-6: Structures and Unions

a) Implement a program to demonstrate the working of nested structures and an array of structures.
b) Implement a program to demonstrate the working of structure and union.

EXP-7: Pointers

a) Implement a program to access a 1D array and a 2D array using pointers
b) Implement a program to concatenate two strings using pointers.
c) Implement a program to determine the length of a string using pointers.

EXP-8: Files

a) Implement a program to display the contents of a file using file handling techniques..
b) Implement a program to copy the contents of one file to another using file handling operations.

References:

1. Somasekhara, "Problem Solving with C ", PHI.
2. Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw-Hill Education, 3rd Edition, 2017.
3. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education, 6th Edition, 2012

Suggested Readings:

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHILearning, 2nd Edition, 1988.
2. YashavantKanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003. 3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4thEdition, 2014.
3. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
4. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.
5. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

Course Code	Course Title					Core / Elective
S25HS911EG	English Lab					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
--	-	-	2	40	60	1

Course Objectives :

1. To enhance students' listening and pronunciation skills through focused practice in phonetics, intonation, and comprehension exercises.
2. To build confidence in speaking through role-plays, group discussions, and presentations for effective communication in academic and professional contexts.

Course Outcomes : On completion of this course, the student will be able to:

1. Demonstrate fluency and spontaneity in conversations, JAM sessions, and picture perception. (Apply (L3), Create (L6))
2. Interpret and apply phonetic symbols, rules, stress, and intonation patterns to enhance pronunciation.
   (Apply (L3), Understand (L2))
3. Analyze and respond appropriately to a variety of listening inputs in academic and social contexts.
   (Apply (L3))
4. Participate constructively in group discussions, debates, role-plays and collaborative speaking tasks.
   (Apply (L3), Evaluate (L5))
5. Prepare and deliver structured presentations with appropriate planning and speaking strategies using verbal and non-verbal cues. (Apply (L3), Create (L6))

UNIT-I: CONVERSATION Skills

- Introducing oneself to others
- Asking for and giving information
- Making requests and responding to them appropriately
- Giving instructions and responding to them appropriately
- JAM
- Picture Perception

UNIT-II: Phonetics

- The Phonetic Alphabet, syllable and minimal pairs
- Stress, Rhythm and Intonation
- British and American English: Vocabulary and Pronunciation

UNIT-III: Listening Skills

- Listening for Comprehension: British Council (Audio tapes)
- Practice Exercises – CALL Lab

UNIT-IV: Collaborative Oral Communication

- Group Discussion
- Debate
- Role play

UNIT-V: Presentation Skills

- Planning
- Preparing
- Practising
- Presenting

Suggested Reading

1. Balasubramanian, T. A Textbook of English Phonetics for Indian Students. Macmillan, 1981.
2. CIEFL.Exercises in Spoken English.Parts.I-III.Oxford University Press.
3. Pillai, Radhakrishna G. Spoken English For You - Level II. 8th Edition. Emerald Publishers, 2014.
4. Sethi, J and PV Dhamija. A Course in Phonetics and Spoken English.2nd Edition.
5. Prentice Hall India Learning Private Limited, 1999.
6. Kumar, T Vijay, K Durga Bhavani and YL Srinivas. English in Use: A Textbook for College Students. 2nd Edition. Macmillan Education India Private Limited, 2020
7. Kumar, E Suresh, and P. Sreehari. A Handbook for English Language Laboratories, Cambridge University Press, 2007
8. Board of Editors. Language and Life: A Skills Approach. Orient BlackSwan, 2018.

Course Code	Course Title						Core / Elective
S25ES911ME	**ENGINEERING GRAPHICS LAB**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
-	L	T	D	P			
		-	**4**	**-**	**40**	**60**	**2**

Course Objectives

1. To inculcate a good understanding of engineering drawing conventions & their significance.
2. To impart skills to make technical drawings.
3. To improve the capability to identify and draw engineering curves to scale.
4. To develop skills of drafting projections of standard geometric entities. (Points, lines, planes, solids with section).
5. To develop 3D visualization skills to understand 2D drawings in 3D space & vice versa.

Course Outcomes

By the end of this course, the students will be able to

1. Use appropriate instruments and apply the engineering conventions to draw engineering objects to scale on a drawing sheet.
2. Make use of AutoCAD tools to create 2D and 3D objects.
3. Make use of AutoCAD software to draft projections of lines, planes and solids
4. Convert isometric views to orthographic & vice versa.
5. Read and interpret Engineering Drawings.

Sl No	Description of the Topic	Contact Hours
	ONLY ON AUTOCAD	
1.	Introduction to AutoCAD Basic commands and simple drawings, polygons	2+2
2.	Conic Sections – I Construction of ellipse, parabola and hyperbola given focus and eccentricity.	2
3.	Cycloids (cycloid & epicycloid) and Involutes (involutes of triangle, square & circle)	2+2
4.	Scales (plain & diagonal scales)	2
	USING CONVENTIONAL DRAWING	
5.	Principles of Engineering Graphics and their significance, Usage of drawing instruments	2
6.	Orthographic Projections - Projections of points in different quadrants.	2
7.	Introduction to straight lines and projections of straight lines. Line parallel to both the planes, line perpendicular to or inclined to one reference plane, Line inclined to both the reference planes.	2+2
8.	Projections of planes – I: Perpendicular planes	2
9.	Projections of planes – II: Oblique planes	2
10.	Projections of solids – I: Polyhedron and solids of revolution,	2

	Projections of solids in simple position.	
11.	Projection of solids – II: Projections of solids when the axes inclined to one or both the reference planes.	2
12.	Isometric projection – I: planes and simple solids	2
13.	Development of surfaces/;Pyramid, Prism, Cylinder and cone	2
14.	Isometric projection – II: combination of two or three solids	2
15.	Conversion of Orthographic Views to Isometric views and vice-versa	2

TEXT BOOKS:

1. Elementary Engineering Drawing, ND Bhatt, Charotar publishers
2. Engineering Drawing, KL Narayana & P Kannaya, Scitech publications
3. Engineering Drawing Graphics & Auto cad, K Venugopal, New Age International
4. Engineering Drawing with a primer on Auto cad, AN Siddique et al, Prentice Hall of India Ltd

Course Code	Course Title						Core/Elective
S25ES112CS	IT Workshop (Skill Development)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Basic Programming	–	–	–	2	40	60	1

Course Objectives: The course aims to:

1. Provide hands-on experience in **assembling, configuring, and troubleshooting** personal computers with installation of OS.
2. Equip students with the ability to **safely navigate the internet**, configure networks, and practice basic cyber hygiene.
3. Develop competency in using **word processing**, **spreadsheet**, and **presentation tools** across cloud-based and desktop platforms.
4. Introduce **basic programming and computation in SCILAB**, including matrix operations and graph plotting.
5. Promote awareness of **collaborative editing tools**, document versioning, and ethical use of online technologies.

Course Outcomes: At the end of this course, students will be able to:

1. Assemble, configure, and troubleshoot PCs and perform OS installations (Windows/Linux).
2. Configure LAN and internet settings, and apply safe browsing and cyber hygiene practices.
3. Prepare structured documents and formatted reports using MS Word, Google Docs, or LibreOffice.
4. Analyze and visualize data in spreadsheets, using functions, logic, and formatting tools.
5. Create presentations and perform basic computational tasks in SCILAB, including plotting and matrix operations.

Additional Course Outcomes:

1. Compare cloud-based office tools (MS 365, Google Workspace, LibreOffice) and collaborate in real-time editing.
2. Use SCILAB scripting features, including file handling, 2D/3D graphing, and solving linear systems.
3. Practice responsible digital behavior including secure browsing, ethical sharing, and password hygiene

EXP-1: PC Hardware

a) Identify PC components and their functions
b) Draw block diagram of CPU configuration
c) Disassemble and reassemble a PC
d) Install Windows OS and verify functionality
e) Install Linux and configure dual-boot
f) Understand BIOS/UEFI settings and boot order configuration
g) Discuss SSD vs HDD vs NVMe storage options

EXP-2: Internet & Worldwide Web

a) Connect to LAN and configure TCP/IP
b) Demonstrate internet connectivity and email
c) Customize browsers: proxy, bookmarks, plug-ins
d) Use search engines and filters
e) Apply cyber hygiene: block pop-ups, unsafe downloads
f) Use cloud storage tools (Google Drive/OneDrive)
g) Practice two-factor authentication and strong password creation

EXP-3: Word Processing Tools

a) Compare MS Word, Google Docs, LibreOffice
b) Create a certificate using advanced formatting
c) Prepare a project abstract with styles, hyperlinks
d) Design a newsletter: TOC, columns, clipart, mail merge
e) Use live collaboration and version history in Google Docs

EXP-4: Spreadsheet Tools

a) Compare Excel, Google Sheets, LibreOffice Calc
b) Create a scheduler using gridlines and formulas
c) GPA calculation with charts, hyperlinks, VLOOKUP
d) Apply sorting, logic, conditional formatting
e) Use collaboration and data validation tools

EXP-5: Presentation Tools

a) Compare PowerPoint, Google Slides, LibreOffice Impress
b) Create slides with shapes, bullets, animations
c) Add interactivity: hyperlinks, media, charts
d) Use master slides, design templates
e) Demonstrate collaborative editing in Slides

EXP-6: Introduction to the SCI Lab environment: editor, console, menus.

a) Explore the interface: editor, console, menus
b) Display messages, accept user input
c) Define & manipulate matrices (add, subtract, transpose)
d) Perform arithmetic functions (sum, mean, max)
e) Save/open .sce script files

EXP-7: Study of Basic SCI Lab Commands & Graphs

a) Use disp(), input(), file I/O
b) Matrix operations
c) Solve systems of linear equations
d) Plot 2D/3D graphs
e) Introduce basic data visualization and labeling in plots

References:

1. **Microsoft Office Step by Step (Office 2021 and Microsoft 365) –** Joan Lambert & Curtis Frye, Microsoft Press, 1st Edition, June 2022.
2. **SCILAB: A Free Software to MATLAB –** Achuthsankar S. Nair & Hema Ramchandran, S. Chand Publishing, 2012 (Latest available edition).
3. **Digital Literacy for Emerging Technologies –** NASSCOM Foundation, latest Open Content (circa 2023).

4. **Comdex Information Technology Course Toolkit –** Vikas Gupta, Wiley Dreamtech, Edition 2020 (latest).
5. **The Complete Computer Upgrade and Repair Book** (3rd Ed, 2008) **–** Cheryl A. Schmidt, Wiley Dreamtech.
6. **IT Essentials: PC Hardware and Software Companion Guide** (3rd Ed, 2008) **–** David Anfinson & Ken Quamme, Cisco Press.
7. **PC Hardware – A Handbook –** Kate J. Chase, PHI Learning, latest reprint edition (2015).

Online Resources:

- **Microsoft 365 Support –** https://support.microsoft.com
- **Google Workspace Learning Center –** https://workspace.google.com/learning-center
- **SCILAB Official Site –** https://www.scilab.org en.wikipedia.org
- **Cyber Hygiene Resources –** https://www.cyberaware.gov
- **NetworkChuck** (Networking Tutorials) **–** YouTube channel
- **PC Building Simulator –** https://www.pcbuildingsimulator.com

CSE II Semester Syllabus

CSE: SEMESTER – II

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P	Contact Hrs/Wk	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	S25BS202PH	Applied Physics	3	1	-	4	40	60	3	4
2	S25BS203MT	Probability, Statistics and Number Systems	3	1	-	4	40	60	3	4
3	S25ES901CS	Data Structures	3	1	-	4	40	60	3	4
4	S25ES202EE	Basic Electrical and Electronics Engineering	3	1	-	4	40	60	3	4
Practical/ Laboratory Courses										
5	S25BS212PH	Applied Physics Lab	-	-	2	2	40	60	3	1
6	S25ES911CS	Data Structures Lab	-	-	4	4	40	60	3	2
7	S25ES912ME	Engineering Workshop	-	-	4	4	40	60	3	2
8	S25PW911CS	Design Thinking and IDEA Lab	-	-	2	2	40	60	3	1
Total			**12**	**04**	**12**	**28**	**320**	**480**	**24**	**22**

Course Code	Course Title						Core/Elective
S25BS202PH	Applied Physics (Common to CSE, IT, AI&DS and CME)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
	3	1	–	-	40	60	4

Course Objectives: The objective of this course is to make the student

1. To impart a thorough understanding of the working principles and applications of lasers and optical fibres.
2. To provide foundational knowledge of semiconductors, their types, and characteristics relevant to electronic devices.
3. To explain the electrical, magnetic, and dielectric properties of materials and their use in modern engineering systems.
4. To introduce quantum mechanical concepts and their applications in microscopic and nanoscopic systems.
5. To familiarize students with electron theories and band theory, leading to an understanding of nanomaterials and their significance.

Course Outcomes: After completion of the course, the student will be able to

1. Explain the principles of laser operation and light propagation in optical fibers, and relate their characteristics to communication and sensing applications.
2. Apply semiconductor physics concepts to understand the behavior of devices like P–N junctions, solar cells, and thermistors used in embedded and smart systems.
3. Analyze the properties of dielectric, magnetic, and superconducting materials to evaluate their suitability for use in electronics, memory devices and high-performance computing systems.
4. Evaluate basic quantum mechanical models and wave functions to interpret the behavior of particles at small scales relevant to nanoscale and quantum systems.
5. Classify materials using band theory and explain how size-dependent properties of nanomaterials contribute to innovations in electronics, AI hardware, sensor technologies.

Unit-I: (10 periods)

Lasers: Characteristics of Lasers, Basic concepts of transitions - absorption, spontaneous and stimulated emissions, Einstein's theory for matter and radiation interaction (A & B coefficients), Concepts of meta stable states, population inversion and pumping, Components of lasers, Types of lasers, Ruby laser, He-Ne laser, Semiconductor laser, Applications of laser.

Fiber optics: Optical fiber as a wave guide, Parts of an optical fibre, Basic principle – total internal reflection, Concept of Numerical Aperture(NA) and acceptance angle, Types of optical fibres – Step Index and Graded Index fibres, Fibre drawing process (Double crucible method), Applications of optical fibres.

Unit-II: (10 periods)
Introduction to Quantum Mechanics: Introduction, de-Broglie's concept – wave nature of particles (Debroglie wavelength), properties of wave function and its physical significance, Time independent and Time dependent schrodinger wave equations, Particle in a 1D box.
Nano materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials – Bottom up methods (sol-gel & CVD) and Top down method (ball milling), Basic ideas of carbon nanotubes, Applications of nano materials.

Unit-III: (10 periods)
Band theory of solids: Classical free electron theory and its limitations, Band theory – Kronig penny model (qualitative treatment), Energy bands in solids, Classification of materials as conductors, semiconductors and insulators.
Semiconductor Physics: Introduction, Intrinsic and extrinsic semiconductors, Concept of a hole, formation of valency band and conduction band, carrier concentration and conductivity in intrinsic semiconductors, Fermi energy level in pure and impure semiconductors, formation of P-N junction diode, Diode Equation and its I-V characteristics, Photo cell, Solar cell, Thermistor and their applications.

Unit-IV: (10 periods)
Dielectric materials: Introduction, Polar and non-polar dielectrics, Types of dielectric polarizations – Expressions for electronic polarizability and ionic polarizability, Frequency and temperature dependence of dielectric polarizations, Ferro electricity – Barium Titanate – Applications of ferroelectrics, Determination of dielectric constant by Capacitance bridge method.

Unit-V: (10 periods)
Magnetic materials: Introduction, Classification of magnetic materials – Dia, para, ferro, antiferro and ferri magnetic materials their properties and ferrites applications, Weiss molecular field theory of ferro magnetism, Domain theory, Hysteresis curve, Soft and hard magnetic materials and their applications.
Superconductivity: Introduction, General properties of superconductors, Meissner effect, Josephson effect, BCS theory (qualitative), Type I and Type II superconductors, Applications of superconductors.

Text Books:

1. B. K. Pandey and S. Chaturvedi, Engineering physics, Cengage Publications.
2. D. K Bhatacharya and Poonam Tandon, Engineering Physics, Oxford University Press.
3. M. Armugam Materials Science, Anuradha Publications.
4. G. Aruldhas, Quantum Mechanics, 2nd Edition, Eastern Economy Edition.
5. S.O.Pillai, Solid State Physics, 4th Edition, New Age International Publishers.
6. Charles P Poole, Jr., Frank J. Owens, Introduction to NanoTechnology, Wiley-India.
7. S. Salivahanan, Basic Electronics, Mc. Graw Hill publications.

Recommended Books:

1. A. J. Dekkar, Solid State Physics, Mac Millan India Ltd.
2. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition.
3. Feynman P Richard,The Feynman Lectures on Physics, 2nd Edition, Addison-Wesley..
4. Nano materials and their Applications, Book series, Springer.

Web links:

1. www.bietdvg.edu/media/department/PHY/data/learningmaterials/Module_III__IV_Lasers Optical_fibers-1.pdf
2. hyperphysics.phy-astr.gsu.edu/hbase/electric/dielec.html
3. scholar.harvard.edu/files/david-morin/files/waves_quantum.pdf
4. www.nhcue.edu.tw/~jinnliu/proj/Device/Lecture01.pdf
5. www.sathyabamauniversity.ac.in/uploads/notes/note_1437661719.pdf

Course Code	Course Title						Core/Elective
S25BS203MT	Probability, Statistics and Number Systems						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Basic Statistics and Probability	3	1	–	-	40	60	4

Course Objectives

1. Understand the foundational principles of probability, statistics, and number systems relevant to intelligent systems and data analysis.
2. Apply appropriate statistical tools including correlation, regression, and distribution models to analyze real-world data.
3. Evaluate hypotheses and infer conclusions using various parametric and non-parametric tests.
4. Explore and utilize number theoretic concepts and real number construction in data security and algorithmic applications.

CO Code	Course Outcomes	Bloom's Level
CO1	Recall and explain fundamental concepts of statistics, probability, probability distributions, hypothesis testing, and number theory.	Remember, Understand
CO2	Apply statistical, probabilistic, and number-theoretic techniques to solve real-world mathematical and engineering problems.	Apply
CO3	Analyze data sets, probabilistic models, statistical tests, and number systems to determine patterns, behaviors, or validity of results.	Analyze
CO4	Evaluate the suitability and correctness of statistical methods, probability models, distributional assumptions, and number-theoretic algorithms in solving mathematical problems.	Evaluate
CO5	Formulate and design models and methods using statistical, probabilistic, and number-theoretic tools for solving complex mathematical and applied problems.	Create

Unit I

Basic Statistics: Measures of Central Tendency, Moments (Moments about the mean and moments about a point). Skewness, Correlation, Karl Pearson's coefficient of correlation, rank correlation. Linear Regression, Regression coefficients.

Curve fitting by the Method of Least Squares, Fitting of Straight line, parabola and Exponential curves.(T1&T2)

Unit II

Introduction of Probability: Conditional Probability, Theorem of total probability, Baye's theorem and its applications, Random variables, Types of Random Variables – Discrete and Continuous random variables, Probability mass function and Probability density function, mathematical expectations. Moment generating function. Joint Probability Distribution-marginal and conditional. (T2&T3)

Unit III

Discrete and Continuous probability distributions: Binomial -Mean, Variance and MGF of Binomial distribution, fitting of Binomial distribution. Poisson - Mean, Variance and MGF of Poisson distribution, fitting of Poisson distribution. Uniform – Mean, Variance and MGF of Uniform distribution. Normal – Mean, Variance and MGF and Exponential - Mean, Variance and MGF of Exponential distribution.(T1 & T2)

Unit IV

Test of hypothesis (Large sample and small sample):

Test of significance: Large sample test for single mean, difference of means, and difference of standard deviations. Small sample test for single mean, difference of means, F-test, Chi-square test for goodness of fit and independence of attributes.(T1, T2, T3)

Unit V

Number System:

Countability of algebraic numbers, Transcendental numbers and construction of Liouville's number, Equivalence classes, construction of real numbers (using Cauchy sequences), Fermat's little theorem.(T4)

TEXT BOOKS:

T1 S.C.Gupta & V.K.Kapoor, "Fundamentals of Mathematical Statistics", S.Chand Pub.
T2. Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications, 43dEdition, 2014.
T3. B.V. Ramana, Engineering Mathematics, Tata McGraw Hill .
T4. Kenneth H. Rosen, Elementary Number Theory, Sixth Edition, Pearson, 2011

REFERENCES/SUGGESTED READING:

R1. Jain & Iyenga, Advanced Engineering Mathematics, 5th Edition, Narosa Publications.
R2. N. Bali, M. Goyal, A textbook of Engineering Mathematics, Laxmi Publications,2010.
R3. Burton, David M, Elementary number theory, Boston : McGraw-Hill, 2002.

Course Code	Course Title					Core / Elective
S25ES901CS	Data Structures					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
Programming for Problem Solving	3	1	-	40	60	4

Course Objectives:

1. Describe the fundamental concepts, classifications, and operations of data structures.
2. Implement and analyze various searching and sorting algorithms for problem-solving
3. Develop solutions using stacks, queues, and linked lists for linear data processing tasks.
4. Construct and traverse non-linear data structures such as binary trees, AVL trees, and graphs.
5. Apply hashing techniques and demonstrate collision resolution strategies in practical scenarios

Course Outcomes: On completion of this course, the student will be able to:

1. Implement sorting and searching algorithms.
2. Understand the concept of ADT, identify data structures suitable to solve problems.
3. Develop and analyse algorithms for stacks, queues using arrays and linked list.
4. Develop algorithm for Binary trees, Balanced Trees, and Graphs.
5. Implement various Hashing and Collision Resolution Technique.

Additional Course Outcomes

1. Students will be able to compare and contrast various sorting and searching algorithms.
2. Students will be able to implement tree traversal algorithms.

UNIT – I
Introduction to Data Structures and Analysis

Basic Concepts: Introduction to data structures, classification of data structures, operations on data structures, Analysis: Basics of Asymptotic Notations, Time Complexity, and Space Complexity

Searching techniques and its Analysis: Linear Search, Binary search, and Fibonacci Search

Sorting Techniques and its Analysis: Quick Sort, Merge Sort and Heap Sort

UNIT – II
Linear Data Structures

Stacks: Stack ADT, definition and operations, Implementations of stacks using array, applications of stacks, Arithmetic expression conversion and evaluation

Queues: Primitive operations; Implementation of queues using Arrays, applications of linear queue, circular queue, and double ended queue (dqueue)

UNIT – III
Linked Lists

Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation.

Types of linked lists: Circular linked lists, doubly linked lists, Stack and Queues using Linked List .

UNIT – IV
Non-Linear Data Structures

Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary tree variants, threaded binary trees, application of trees.

Binary search trees: Binary search trees, properties, and operations;
Balanced search trees: AVL trees;
Introduction to M-Way search trees, B trees;

UNIT – V
Graphs and Hashing

Graphs: Basic concept, graph terminology, Graph Representations-Adjacency matrix, Adjacency lists, graph implementation, Graph traversals – BFS, DFS.

Hashing and collision: Introduction, Hash Tables, Hash Functions, Collisions, Collision Resolution Techniques, Applications of Hashing.

Case Study: Select a real-world scenario (like social networks, transportation systems, or database management) and design an efficient solution using appropriate data structures, demonstrating how their implementation addresses the problem effectively while optimizing performance.

Text Books:

1. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India
2. Reema Thareja, Data Structures Using C, Oxford, Second Edition, 2014

Reference Books:

1. S. Lipschutz, Data Structures, Tata McGraw Hill Education, 1st Edition, 2008.
2. D. Samanta, Classic Data Structures, PHI Learning, 2nd Edition, 2004.

Online Resources:
1. https://ekumbh.aicte-india.org/allbook.php#
2. https://www.geeksforgeeks.org/learn-dsa-in-c/
3. https://www.tutorialspoint.com/dsa_using_c/index.htm

Course Code	Course Title						Core / Elective
S25ES202EE	**Basic Electrical and Electronics Engineering (Common to all CSE allied Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
---	**3**	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives

- To provide an understanding of basics in Electrical Circuits.
- To understand the characteristics of diode and its applications.
- To understand the design concepts of BJT.

Course Outcomes

1. To analyze the electrical circuits using different theorems.
2. To analyze the AC circuits in terms of different parameters.
3. To understand the basic principles of Electrical Machines.
4. To Study Diode characteristics and applications as rectifiers and filters.
5. To analyze the characteristics of BJT and its applications**.**

Unit I – DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

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, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit III – Qualitative Analysis of Electrical Machines

Faradays laws, Fleming's right-hand and left hand rules, define transformer, motor, generator, principle of operation of transformer, motor and generator, types of motors and generators & their practical applications.

Unit IV – PN Junction Diode

Characteristics, Half wave rectifier, Full wave rectifier, filters, ripple, regulation, TIF and efficiency, Zener diode and Zener diode regulators, CRO block diagram and applications.

Unit V – Transistors

BJT construction and working, BJT voltages and currents, modes of operation, configurations and characteristics of BJT (CB, CE, CC), transistor acts as switch, applications of transistors.

Text Books:

1. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2002.
2. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "Basic Electrical Engineering" Tata McGraw Hill, Publications, 2009.
3. Robert Boylestad L. and Louis Nashelsky, "Electronic Devices and Circuit Theory" PHI, 2007.

Reference Books:

1. A Sudhakar, Shyammohan S Palli, "Circuits and Networks", Tata McGraw-Hill, 4th Edition, 2010.
2. I J Nagrath, DP Kothari, "Electrical Machines", Tata McGraw-Hill publication, 3rd Edition, 2010.
3. Salivahanan, Suresh Kumar and Vallavaraj, Electronic Devices and Circuits, 2nd edition, Tata McGraw – Hill, 2010.

Course Code	Course Title						Core/Elective
S25BS212PH	Applied Physics Lab (Common to CSE, IT, AI&DS and CME)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
--	-	-	–	2	40	60	1

Course Objectives: The objective of this course is to make the student

1. To help students connect fundamental physics concepts with real-world measurements through hands-on experimentation involving semiconductors, optics, and materials.
2. To train students in operating scientific instruments such as lasers, optical fibers, thermistors, and Hall-effect setups, relevant to electronic and sensing applications.
3. To develop analytical thinking and data interpretation skills by measuring physical parameters and evaluating characteristic curves of devices.
4. To enable students to analyze experimental uncertainty and sources of error using graphical methods and comparison with theoretical models.
5. To enhance students' ability to present experimental findings clearly and technically, through structured lab reports and scientific communication practices.

Course Outcomes: After completion of the course, the student will be able to

1. Explain the principles behind experimental setups involving lasers, semiconductors, and materials, and relate them to basic engineering applications.
2. Conduct experiments using instruments such as diffraction gratings, optical fibres, and P–N junctions to collect and record accurate data.
3. Analyse the behavior of semiconductor devices by evaluating their I–V characteristics and determining key parameters like energy gap and Hall coefficient.
4. Evaluate experimental results using error estimation and graphical interpretation, and compare them with theoretical predictions.
5. Compile lab findings into clear, technically accurate reports demonstrating structured presentation and scientific communication.

LIST OF EXPERIMENTS

1. Determination of wavelength of laser using diffraction grating.
2. Determination of Numerical Aperture (NA) and Acceptance angle of an optical fiber and also to determine the power loss per meter of the cable.
3. To draw the I-V characteristics of P-N junction diode and to evaluate series resistance in forward and reverse bias conditions.
4. To draw the I-V characteristics of solar cell and to calculate fill factor.
5. To determine the constants A and B using Thermistor characteristics.
6. To find the value of energy gap of a given semiconductor.
7. To find the value of Plank's constant using photo cell.
8. To determine the Phase transition temperature of the given dielectric.
9. To draw the curve between the magnetic field and Intensity of magnetization for a given specimen and to find out Coercivity and Retentivity of the specimen.
10. Determination of carrier concentration, mobility and Hall co-efficient in a semiconductor using Hall Effect experiment.

Note: A minimum of eight experiments to be done in one semester.

Course Code	Course Title					Core / Elective
S25ES911CS	Data Structures Using C Lab					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
Programming for Problem Solving Lab	-	-	4	40	60	2

Course Objectives:

1. Develop programs for various searching and sorting techniques.
2. Differentiate Linear and Non Linear Data Structures.
3. Understand and implement expression evaluation using stacks.
4. Implement various operations on trees and graphs traversal techniques.
5. Design and implement basic hashing techniques and demonstrate collision resolution methods.

Course Outcomes: On completion of this course, the student will be able to:

1. Understand the concept of data structures, C Programming and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.
2. Understand linear data structures for processing of ordered or unordered data.
3. Explore various operations on dynamic data structures like single linked list anddoubly linked list.
4. Explore the concept of non linear data structures such as trees and graphs.
5. Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

Additional Course Outcomes

1. Apply appropriate data structures and algorithms to solve real-world computational problems efficiently.
2. Analyze the time and space complexity of algorithms to choose optimal solutions for a given problem.

NOTE: The experiments could also practice using other programming languages like C++/ JAVA / PYTHON/ R etc.,

LIST OF EXPERIMENTS

Linear Data Structures

1. Implement Linear Search, Binary Search, and Fibonacci Search techniques.
2. Implement Merge Sort, Quick Sort, and Heap Sort algorithms to sort a list of integers in ascending order.
3. Implement stack operations using arrays.
4. Implement stack operations using linked lists.
5. Implement queue operations using arrays.
6. Implement queue operations using linked lists.
7. Implement a stack-based solution to convert an infix expression to its postfix equivalent using arrays.
8. Implement a stack-based solution to evaluate a postfix expression using arrays.
9. Implement a singly linked list with insertion, deletion, and traversal operations.

Non-Linear Data Structures

10. Implement Depth-First Search (DFS) traversal for a graph.
11. Implement Breadth-First Search (BFS) traversal for a graph.
12. Implement insertion operation in a Binary Search Tree (BST).
13. Implement in-order, pre-order, and post-order traversal operations in a Binary Search Tree (BST).

Text Books:

1. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, PearsonEducationIndia
2. Reema Thareja, Data Structures Using C, Oxford, Second Edition, 2014

Reference Books:

1. S.Lipschutz,"DataStructures",TataMcGrawHillEducation,1st Edition,2008.
2. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition,2004.

Online Resources:

1. https://www.geeksforgeeks.org/learn-dsa-in-c/
2. https://www.tutorialspoint.com/dsa_using_c/index.htm

Course Code	Course Title						Core/Elective
SES912ME	Engineering Workshop						Core
Prerequisite	Course hours per week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	40	60	2

Course Objectives:

1. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances
2. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
3. To gain basic knowledge on various manufacturing processes used for the production of various engineering products.
4. To gain hands on exposure on 3D Printing and working knowledge with some simple designs
5. Adopt safety practices while working with various tools.

Course Outcomes:

1. Identify and demonstrate the usage of different tools to be used in various manufacturing trades with safety measures.
2. Apply the skills developed to undertake the jobs connected to various engineering workshop trades including carpentry, sheet metal, plumbing ,and soldering
3. Demonstrate the knowledge of various machine tools and their operations such as machining, injection moulding, foundry, casting, drilling, lathe machine, grinding, welding and fitting.
4. Apply basic Electrical Engineering knowledge for house wiring Practice.
5. Design and 3D printing of some simple geometrical models.

LIST OF EXPERIMENTS:

A.TRADE FOR EXERCISES:

1. **CARPENTRY**: Sawing and Grooving, T-lap joint and dove-tail joint.
2. **HOUSE WIRING**: Series wiring and parallel wiring by one way switch, two way switching for stair case light, tube light connections.
3. **SHEET METAL WORKING**: Open Scoop, Funnel, Rectangle tray and a cone.
4. **SOLDERING:** Solder basics anddemonstration. Basic soldering practice Soldering two or more components on Print Circuit Board(PCB)
5. **PLUMBING**: Preparation of nipple and fitting to elbow, tee, union and coupling tap connection and shower connection.
6. **3D Printing:** To design and print geometrical models

B.TRADES FOR DEMONSTRAYION AND EXPOSURE:

1. Machines (lathe, drilling and grinding)
2. Injection Moulding.
3. Mould making and casting.
4. Welding

5. Foundry
6. Fitting

C.PRESENTATIONS AND VIDEOS LECTURES:

1. Manufacturing methods.
2. Glass cutting.
3. CNC lathe.

Note: Atleast two exercises from each trade.

TEXT/REFERENCE/ADDITIONALBOOKS:

1. Venugopal,K,"Workshop Manual", Anuradha Publicstions,Kumbakonam,TN,2012.
2. K.C.John, "Mechanical Workshop" 2nd Edn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol.1, Asian Publishers,Edu., 1993.
4. G.S.Sawhney, "Mechanical Experiments and Workshop Practice", I.K.International Publishing house, New Delhi,2009.

Course Code	Course Title					Core / Elective
SPW911CS	Design Thinking and IDEA Lab					Core
Prerequisite	Contact hours per week			CIE	SEE	Credits
	L	T	P/D			
--	-	-	2	40	60	1

Course Objectives:

1. Introduce students to the **Design Thinking process** as a systematic approach to solving user-centric problems.
2. Foster **creativity, collaboration, and innovation** through experiential learning and real-time application.
3. Help students understand and apply **learning styles, memory strategies**, and **empathy** in design.
4. Promote prototyping and testing skills using **IDEA Lab practices** and tools.
5. Apply **emerging technologies** like AI, IoT, and AR/VR to address domain-specific engineering problems.

Course Outcomes: On completion of this course, the student will be able to:

1. Apply various learning styles, memory techniques, and emotional intelligence to understand user behavior.
2. Use the Design Thinking process (Empathize–Define–Ideate–Prototype–Test) to develop innovative solutions.
3. Create and test rapid prototypes using iterative methods and user feedback.
4. Work collaboratively using digital tools for real-time engineering problem-solving.
5. Integrate modern technologies (AI, IoT, AR/VR) into user-centric product designs.

Additional Course Outcomes

1. Analyze and apply design thinking tools (e.g., empathy maps, journey maps, design canvases) effectively.
2. Develop tech-based prototypes for domains aligned with national innovation missions or SDGs.

UNIT - I

Learning Systems & Emotional Intelligence

- Kolb's Learning Styles & Memory Enhancement Techniques
- Emotional Intelligence & Empathy Mapping
- Human-Centered Design (HCD) Foundations

Activity:

- Charts: Learning Styles, Memory Maps
- Peer Empathy Exercise

UNIT - II

Design Thinking Process

- Five Phases: Empathize, Define, Ideate, Prototype, Test
- Brainstorming, User Personas, and Design Sprint Basics
- Aligning Customer Needs with Product Experience

Activity:

- Create a design canvas for a common-use product (e.g., ATM, Campus App)
- Group Design Walk-through

UNIT - III

Creativity, Prototyping & Testing

- Creative Thinking Tools: SCAMPER, Mind Maps
- Rapid Prototyping and Feedback Mechanisms
- Usability Testing and Iteration

Activity:

- Develop low/high fidelity prototypes using digital tools
- Peer Testing with Feedback Form

UNIT - IV

IDEA Lab Innovation Practice

- Role of IDEA Lab, Makerspaces, and Collaborative Innovation
- Digital Co-design Tools: Miro, Jamboard, Lucidchart
- Ethical Design and IP Awareness

Activity:

- Mini Design Sprint
- Document using collaborative tools

UNIT - V

Emerging Technologies and Real-World Case Study*

- Design Thinking with AI, AR/VR, IoT, Quantum Computing
- Use cases in Healthcare, AgriTech, Smart Cities

Case Study:

Title: *Smart Healthcare Monitoring Using IoT and AI*

- Problem: Elderly care monitoring gaps
- Solution: IoT-based wearables + AI dashboard
- Prototype: Real-time vitals with caregiver alerts
- Feedback: Use in remote villages

Activity:

- Students choose a domain, apply DT + tech, and present their concept

**Note:* This unit is aimed at introducing students to how Design Thinking applies to current and emerging technologies. No prior coding or domain expertise is required. Emphasis is on ideation, use-case modeling, and concept presentation.

Text Books:

1. E. Balaguruswamy (2022), Developing Thinking Skills (The way to success), Khanna Book Publishing Company.
2. John. R. Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
3. Tim Brown, Change by Design, Harvard Business Review Press, 2009

Reference Books:

1. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover - 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).
2. Vijay Kumar, 101 Design Methods, Wiley, 2012

Online Resources:

1. Design Thinking for Innovation – Coursera (UVA Darden) https://www.coursera.org/learn/uva-darden-design-thinking-innovation
2. IDEO U – Design Thinking Courses https://www.ideou.com
3. Google Design Sprint Kit https://designsprintkit.withgoogle.com
4. Miro Templates for Collaboration https://miro.com/templates
5. Jamboard & Lucidchart Tutorials – YouTube Channels