FACULTY OF ENGINEERING

Scheme of Instruction & Examination
For
Four Year Degree Programme of

Bachelor of Engineering (B.E)

in

Artificial Intelligence & Data Science

(With effect from the academic year 2025–26)

Empower Women - Impact the World

STANLEY COLLEGE OF ENGINEERING AND TECHNOLOGY FOR WOMEN (AUTONOMOUS)
(Affiliated to Osmania University)
(Accredited by NAAC with "A" Grade)
ABIDS, HYDERABAD-500001, Telangana.

Stanley College of Engineering and Technology for Women

(Approved by AICTE, Accredited by NAAC 'A', UGC Autonomous)
Abids, Hyderabad, Telangana–500001

Department of Artificial Intelligence & Data Science

INSTITUTE VISION AND MISSION

Vision:

Empower Women, Impact the World. Empowering girl students through professional education integrated with values and character to make an impact in the World.

Mission:

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

DEPARTMENT VISION AND MISSION

Vision:
To be the center of excellence in empowering girl students with quality education to make lifelong global innovators & contributors in the ever-advancing field of Artificial Intelligence & Data Science.

Mission:
1. To provide a student-centric education that aims to focus on a four-tiered strategy of Education, Research, Development and Innovation by formulating a meaningful curriculum that combines theory and practical skills.

2. To Foster industry collaborations for impactful applications, industry readiness & encourage students in research, innovations and inventions through quality internships, hackathons & other technical events.

3. To let our young minds flourish in any industry by promoting continuous learning and develop employability skills through quality training programs.

4. To produce competent and ethical engineers who will design, develop, innovate & invent ethical AI systems, leaving a remarkable impact on the technological needs of the society and achieve self-sustainability.

Program Educational Objectives: (PEO's)

PEO1: To provide graduates with the proficiency to utilize the fundamental knowledge of basic sciences, mathematics, artificial intelligence, data science and statistics to build systems that require management and analysis of large volume of data.
PEO2: To enrich graduates with necessary technical skills to pursue pioneering research in the field of AI
PEO3: To encourage students to think critically, develop innovative skills, expose them to an array of ideas and information through numerous technical events, hackathons and quality internships.

Program Specific Outcomes: (PSO's)

PSO1: To instill interest and curiosity in students in the field of AI and Data Science through project-based learning.
PSO2: To provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and pursue Research in Artificial Intelligence and Data science with ethical values.
PSO3: To promote ethical and responsible AI practices for the benefit of humanity and to harness AI for a positive societal impact & meet global standard.

PROGRAM OUTCOMES

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)

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
EC	Electronics and Communication 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
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.

SMC901AD Induction Program (Mandatory)	**3 weeks' Duration**	
Induction program for students to be offered right at the start of the first year	● Physical Activities ● Universal Human Values ● Lectures by Eminent People ● Familiarization to Dept./Branch & Innovations	● Creative Arts ● Literary ● Proficiency Modules ● Visits to local Areas

Stanley College of Engineering and Technology for Women (Autonomous)

B.E- Artificial Intelligence & Data Science

CREDITS DISTRIBUTION-SEMESTER WISE

Subject	I	II	III	IV	V	VI	VII	VIII	AI&DS (A) (2025-29) Credits
HS	**5**					**4**			**9**
BS	**9**	**9**		**3**					**21**
ES	**8**	**11**	**5**						**24**
PC			**16**	**18**	**17**	**10**	**7**		**68**
PE					**3**	**3**	**10**		**16**
OE						**3**		**3**	**6**
PW		**1**			**2**	**1**	**5**	**8**	**17**
Total	**22**	**21**	**21**	**21**	**22**	**21**	**22**	**11**	**161**

COMPARISON BETWEEN GATE AND AI&DS SYLLABUS

GATE (Data Science & Artificial Intelligence) (2025)	AI&DS Subject Names and Semester
Probability and Statistics	Probability and Statistics (II Sem)
Linear Algebra	Linear Algebra & Calculus (I Sem)
Calculus and Optimization	Linear Algebra & Calculus (I Sem)
Programming, Data Structures, and Algorithms	Programming for Problem Solving (I Sem) Programming for Problem Solving Lab Using C (I Sem) Python Programming (II Sem) Python Programming Lab (II Sem) Data Structures (III Sem) Data Structures Lab (III Sem) Design & Analysis of Algorithms (V Sem)
Database Management and Warehousing	Database Management System (III Sem) Database Management System Lab (III Sem) Architecture for Management of Large Datasets (VI Sem)
Machine Learning	Machine Learning (VI Sem) Machine Learning Lab (VI Sem)
Artificial Intelligence	Artificial Intelligence & Robotics (IV Sem)

AI&DS SEMESTER-I

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
SMC 901 AD Three Week Induction Program										
1	S25BS101MT	Linear Algebra and Calculus	3	1	-	4	40	60	3	4
2	S25BS901CH	Engineering Chemistry	3	1	-	4	40	60	3	4
3	S25ES101AD	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 and Laboratory courses										
6	S25BS911CH	Engineering Chemistry Lab	-	-	2	2	40	60	3	1
7	S25ES111AD	Programming for Problem Solving Lab	-	-	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	S25ES112AD	IT Workshop (Skill Course)	-	-	2	2	40	60	3	1
Total			**13**	**02**	**14**	**29**	**400**	**600**		**22**

AI&DS SEMESTER-II

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25BS202PH	Applied Physics	3	1	-	4	40	60	3	4
2	S25BS203MT	Probability, Statistics and Number System	3	1	-	4	40	60	3	4
3	S25ES902AD	Python Programming	2	-	-	2	40	60	3	2
4	S25ES202EE	Basics of Electrical and Electronics Engineering	3	1	-	4	40	60	3	4
Practical and Laboratory courses										
5	S25BS212PH	Applied Physics Lab	-	-	2	2	40	60	3	1
6	S25ES912AD	Python Programming Lab	-	-	4	4	40	60	3	2
7	S25ES912ME	Engineering Workshop	-	-	4	4	40	60	3	2
8	S25ES202EE	Basics of Electrical and Electronics Engineering Lab	-	-	2	2	40	60	3	1
9	S25PW911AD	Design Thinking and IDEA Lab (Skill Course)	-	-	2	2	50	-	-	1
Total			**11**	**03**	**14**	**28**	**370**	**480**		**21**

AI&DS SEMESTER-III

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25ES901AD	Data Structures	3	-	-	3	40	60	3	3
2	S25PC301AD	Discrete Mathematics	3	-	-	3	40	60	3	3
3	S25PC302AD	Digital Electronics and Computer Organization	3	-	-	3	40	60	3	3
4	S25PC303AD	Database Management System	3	1	-	4	40	60	3	4
5	S25PC304AD	Object Oriented Programming using Java	3	1	-	4	40	60	3	4
6	S25MC901HS	Indian Constitution	2	-	-	2	40	60	3	0
Practical/ Laboratory Courses										
7	S25ES911AD	Data Structures Lab	-	-	4	4	40	60	3	2
8	S25PC313AD	Database Management System Lab	-	-	2	2	40	60	3	1
9	S25PC314AD	Object Oriented Programming using Java Lab	-	-	2	2	40	60	3	1
Total			**17**	**02**	**08**	**27**	**360**	**540**		**21**

AI&DS SEMESTER-IV

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25BSXXXAD	Mathematical Foundations for Artificial Intelligence	3	-	-	3	40	60	3	3
2	S25PC401AD	Artificial Intelligence and Robotics	3	1	-	4	40	60	3	4
3	S25PC402AD	Operating Systems	3	-	-	3	40	60	3	3
4	S25PC403AD	Foundation of Data Science	3	-	-	3	40	60	3	3
5	S25PC404AD	Automata Theory and Compiler Design	3	-	-	3	40	60	3	3
6	S25MC902CH	Environment Science	2	-	-	2	40	60	3	0
Practical/ Laboratory Courses										
7	S25PC412AD	Operating Systems Lab	-	-	2	2	40	60	3	1
8	S25PC413AD	Data Science Lab	-	-	2	2	40	60	3	1
9	S25PC415AD	Web Programming Lab	-	1	4	5	40	60	3	3
S25PW912AD		Internship-I	The students have to undergo an Internship of 4 week duration –during summer vacation. To be evaluated in the 5th Semester.							
Total			**17**	**02**	**08**	**27**	**360**	**540**		**21**

AI&DS SEMESTER –V

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25PC501AD	Machine Learning Techniques	3	1	-	4	40	60	3	4
2	S25PC502AD	Computer Networks	3	-	-	3	40	60	3	3
3	S25PC503AD	Design and Analysis of Algorithms	3	1	-	4	40	60	3	4
4	S25PC504AD	Software Engineering	3	-	-	3	40	60	3	3
5	S25PE50XAD	Professional Elective -I	3	-	-	3	40	60	3	3
Practical/ Laboratory Courses										
6	S25PC511AD	Machine Learning Techniques Lab			2	2	40	60	3	1
7	S25PC512AD	Computer Networks Lab	-	-	2	2	40	60	3	1
8	S25PC514AD	Software Engineering Lab	-	-	2	2	40	60	3	1
9	S25PW913AD	Mini Project	-	-	2	2	50	-	-	1
10	S25PW912AD	Internship-I	Internship Evaluation				50	-	-	1
Total			**15**	**02**	**08**	**25**	**420**	**480**		**22**

AI&DS SEMESTER-VI

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25HS901BM	Managerial Economics and Financial Accounting	3	-	-	3	40	60	3	3
2	S25PC601AD	Deep Learning	3	-	-	3	40	60	3	3
3	S25PC602AD	Architecture for Management of Large Datasets (BDA)	3	-	-	3	40	60	3	3
4	S25PE60XAD	Professional Elective-II	3	-	-	3	40	60	3	3
5	S25OE90XXX	Open Elective-I (Entrepreneurship & Startups)	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC611AD	Deep Learning Lab	-	-	2	2	40	60	3	1
7	S25PC612AD	Architecture for Management of Large Datasets (BDA Lab)	-	-	4	4	40	60	3	2
8	S25PC613AD	Software Tools and Techniques Lab	-	-	2	2	40	60	3	1
9	S25HS912EG	Advanced Communication Skills Lab	-	-	2	2	40	60	3	1
10	S25PW914AD	Technical Seminar	-	-	2	2	50	-	-	1
S25PW915AD		Internship-II	The students have to go to an internship of 6 week duration after/during VI- Semester (Summer Vacation). Evaluated in 7th Semester							
Total			**15**	**00**	**12**	**27**	**410**	**540**		**21**

AI&DS SEMESTER-VII

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25PC701AD	Generative Artificial Intelligence	3	-	-	3	40	60	3	3
2	S25PC702AD	Data and Internet Security	3	-	-	3	40	60	3	3
3	S25PE70XAD	Professional Elective-III	3	-	-	3	40	60	3	3
4	S25PE70XAD	Professional Elective-IV	3	-	-	3	40	60	3	3
5	S25PE70XAD	Professional Elective-V	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC711AD	Generative Artificial Intelligence Lab	-	-	2	2	40	60	3	1
7	S25PE71XAD	Professional Elective Lab	-	-	2	2	40	60	3	1
9	S25PW916AD	Project Work-I	-	-	6	6	50	-	3	3
10	S25PW915AD	Internship-II	6th Sem Internship -II Evaluation				50	-	-	2
Total			15	00	12	27	420	480		22

AI&DS SEMESTER-VIII

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25OE90XXX	Open Elective-II	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
2	S25PW917AD	Project Work-II	-	-	16	16	50	100	3	8
Total			**03**	**-**	**16**	**19**	**90**	**160**	**-**	**11**

List of Professional Electives: R25 AI&DS (Tentative)

The curriculum has specified several slots wherein the students can take electives to broaden their grasp on the subjects related to Artificial Intelligence as well as to Data Science. Some suggested electives are listed here.

LIST OF PROFESSIONAL ELECTIVES (Tentative)

Professional Elective-I		
SI.No	**Course Code**	**Course Title**
1.	S25PE501AD	Expert Systems
2.	S25PE502AD	Machine Vision
3.	S25PE503AD	Exploratory Data Analysis
4.	S25PE504AD	Advanced Databases
5.	S25PE505AD	Distributed Systems
6	S25PE506AD	Cyber Security

Professional Elective-II		
SI.No	**Course Code**	**Course Title**
1.	S25PE601AD	Cognitive Robotics
2.	S25PE602AD	Soft Computing
3.	S25PE603AD	Business Intelligence and Analytics
4.	S25PE604AD	Information Retrieval Systems
5.	S25PE605AD	Security and Privacy in Cloud Computing
6.	S25PE606AD	Digital Forensics

Professional Elective-III		
SI.No	**Course Code**	**Course Title**
1.	S25PE701AD	Game Programming + Lab (S25PE711AD)
2.	S25PE702AD	Natural Language Processing + Lab(S25PE712AD)
3.	S25PE703AD	Forecasting Techniques & Data Visualization + Lab(S25PE713AD)
4.	S25PE704AD	NOSQL Database + Lab(S25PE714AD)
5.	S25PE705AD	Cloud Computing
6.	S25PE706AD	Block Chain Technology

Professional Elective-IV		
SI.No	**Course Code**	**Course Title**
1.	S25PE707AD	Robotics Intelligent Systems
2.	S25PE708AD	Speech Processing +Lab(S25PE718AD)
3.	S25PE709AD	Geo Spatial Data Analysis + Lab(S25PE719AD)
4.	S25PE70AAD	Programming with SPARK +Lab (S25PE71AAD)
5.	S25PE70BAD	Devops + Lab (S25PE71BAD)
6.	S25PE70CAD	Introduction to Internet of Things + Lab (S25PE71CAD)

Professional Elective-V		
SI.No	**Course Code**	**Course Title**
1.	S25PE70DAD	Unmanned Aerial Vehicles
2.	S25PE70EAD	Reinforcement Learning
3.	S25PE70FAD	Web and Social Media Analytics
4.	S25PE70GAD	Malware Analysis
5.	S25PE70HAD	Fundamentals of Quantum Computing
6.	S25PE70IAD	Open Source Programming for Internet of Things

Open Electives offered by AI&DS department to other Departments:

Course Code	**Course Title**
S25OE901AD	Artificial Intelligence
S25OE902AD	Foundations of Data Science
S25OE903AD	Big Data Analytics

Stanley College of Engineering and Technology for women (A)

List of Open Electives Offered

Department	Course Code	Course Name
AI&DS	S25OE901AD	Artificial Intelligence
	S25OE902AD	Foundations of Data Science
	S25OE903AD	Big Data Analytics
AI&ML	S25OE901AM	Exploratory Data Analysis
	S25OE902AM	Natural Language Processing
CME	S25OE901CM	Machine Learning
	S25OE902CM	Web Application Development
CSE	S25OE901CS	Cloud Computing
	S25OE902CS	Computer Networks
	S25OE903CS	Database Management Systems
	S25OE904CS	Operating Systems
	S25OE905CS	OOPs using Java
	S25OE906CS	Software Engineering
	S25OE907CS	Data Science using R
ECE	S25OE901EC	Principles of Communication Engineering
	S25OE902EC	Data Communication and Computer Networks
	S25OE903EC	Fundamentals of Internet of Things

	S25OE904EC	5G Communication Technology
	S25OE905EC	Embedded Systems
	S25OE906EC	Smart Sensors for IoT
	S25OE907EC	Sensors and Actuators
	S25OE908EC	Wireless Sensor Networks
	S25OE909EC	Power Management for IoT Devices
	S25OE910EC	Electronics for Health Care
EEE	S25OE901EE	Basics of Power Electronics
	S25OE902EE	Non-Conventional Energy Sources
	S25OE901EE	Electrical Vehicles
IT	S25OE901IT	Operating Systems
	S25OE902IT	Cyber Security
	S25OE903IT	Database Management Systems
	S25OE904IT	Software Engineering
MBA	S25OE901BM	Management and Organizational Behavior
	S25OE902BM	Innovation Management & IPR
	S25OE903BM	Managerial Economics and Accounting
	S25OE904BM	Supply Chain Management
	S25OE905BM	Startup and Entrepreneurship
Mechanical	S25OE901ME	Fundamentals of Robotics
	S25OE902ME	Industrial Safety
	S25OE903ME	3D printing & Design

Audit Courses:

Mathematics	S25AC901MT	Operations Research
	S25AC902MT	Partial Derivatives and Numerical methods
	S25AC903MT	Fundamentals of Mathematics for Machine Learning
English	S25AC901EG	Soft Skills and Interpersonal Skills
	S25AC903EG	Pedagogy Studies
	S25AC904EG	Technical Writing for Research
EEE	S25AC901EE	Concepts of Electrical Engineering
CSE	S25AC901CS	Concepts of Computer Science and Engineering

AI&DS SEMESTER-I

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
SMC 901 AD Three Week Induction Program										
1	S25BS101MT	Linear Algebra and Calculus	3	1	-	4	40	60	3	4
2	S25BS901CH	Engineering Chemistry	3	1	-	4	40	60	3	4
3	S25ES101AD	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 and Laboratory courses										
6	S25BS911CH	Engineering Chemistry Lab	-	-	2	2	40	60	3	1
7	S25ES111AD	Programming for Problem Solving Lab	-	-	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	S25ES112AD	IT Workshop (Skill Course)	-	-	2	2	40	60	3	1
Total			**13**	**02**	**14**	**29**	**400**	**600**		**22**

Course Code	Course Title						Core / Elective
S25BS101MT	**Linear Algebra and Calculus (Common to All)**						**Core**
	Contact Hours per Week						
Prerequisite	L	T	D	P	CIE	SEE	Credits
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.

CO Code	**Course Outcomes**	**Bloom's Taxonomy Level**
CO1	Recall fundamental definitions, formulas, and standard methods in linear algebra, differential calculus, multivariable calculus, and integration.	Remember
CO2	Understand the fundamental concepts of matrices, eigenvalues and eigenvectors, differential calculus, multivariable functions, and multiple integrals relevant to engineering applications	Understand
CO3	Apply appropriate mathematical techniques such as matrix operations, eigen analysis, differential calculus, multivariable functions, and integration methods to solve related problems	Apply
CO4	Analyze mathematical problems to select and compare appropriate techniques from linear algebra and calculus for effective problem-solving	Analyze
CO5	Evaluate different mathematical techniques in linear algebra and calculus based on their accuracy, efficiency, and suitability for solving given problems	Evaluate

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 (Common to all Branches)**				**Core**
Prerequisite	Contact Hours per Week		CIE	SEE	Credits
	L	T			
-	3	1	**40**	**60**	4

Course Objectives

1. Apply the principles of electrochemistry 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. Explore the knowledge of Bio informatics on Drug design. Familiarizes with green chemistry and Engineering Materials.

Course Outcomes: Student will be able to:

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

UNIT 1:(10 Hrs) ELECTROCHEMISTRY & BATTERIES

Electrochemistry: 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 and their advantages, $H_2 – O_2$ fuel cell and, $CH_3OH – O_2$ fuel cell

UNIT 2: (10 Hrs) WATER CHEMISTRY & CORROSION

Water Chemistry: Hardness of water, types of hardness, units of hardness, Determination of temporary, permanent & Total hardness by EDTA method, Numerical. Alkalinity of water - its determination. Alkaline water – its uses. Water softening by ion exchange and reverse osmosis methods. Specification of potable water. Sterilization by chlorination. Basic concepts of BOD, COD.

Corrosion:

Causes and effects of corrosion, chemical(dry) corrosion, Electrochemical(wet) corrosion-Mechanisms. Types of electrochemical corrosion, Factors affecting the rate of corrosion –Corrosion control methods-catholic protection: sacrificial anode method and impressed current method.

UNIT 3: (10 Hrs) POLYMER CHEMISTRY

Polymers: Basic terms of polymers: Monomer, Polymer, Functionality, Degree of polymerization. Nomenclature of Polymers- Types of Polymerization (Addition, Condensation, Co Polymeration). Preparation, Properties and Applications- Plastics: PET and Bakelite, Elastomers: Buna-S Rubber. Fibers: Kevlar

Biodegradable polymers: Introduction- Preparation, Properties and Applications of Polylactic acid.

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

UNIT 4: (10 Hrs) CHEMICAL FUELS

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

Solid fuels: Coal and its chemical composition, Proximate analysis, 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.

Combustion: Ignition temperature of a fuel, calculation of air quantities by weight and volume required for the combustion of the fuels-Numerical.

UNIT 5 (10 Hrs) COMPUTATIONAL CHEMISTRY, NANO MATERIALS, GREEN CHEMISTRY & BIODIESEL

Computational Chemistry:

Introduction Bioinformatics- Protein Structure- structure based Classification. Protein structure databases and tools.

Nano Materials: Introduction – chemical synthesis by sol gel method and Precipitation method – Industrial Applications of Nano materials.

Green Chemistry: Concept and principles of green chemistry, examples of clean technology.

Bio diesel: Sources of Biodiesel, Synthesis of Biodiesel (Trans esterification)- Applications of Biodiesel.

TEXT BOOKS:

1. P.C.Jain and M.Jain, Engineering Chemistry, Dhanapathi Rai publishing
2. Text Book of Engineering Chemistry bu Shashi 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. Principles of Physical Chemistry by Puri, Sharma and Pathania S.N. Chand & Co. New Delhi (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 Inorganic 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, PHI Publications,2013.

Course Code	Course Title					Core / Elective
S25ES101AD	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.	Understand 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 (Common to all Branches)**						**Core**
Prerequisite	Contact Hours per week				CIE	SEE	Credit
	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)

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

- -. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
- 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
- E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain
- A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak. Sussan George, 1976, How the
  Other Half Dies, Penguin Press, Reprinted 1986
- Smriti Shristava, "Human Values and Professional Ethics", Katson Publications,2007

Course Code	Course Title			Core / Elective
S25BS911CH	**ENGINEERING CHEMISTRY LAB (Common to all Branches)**			**Core**
Prerequisite	Contact Hours per Week P	CIE	SEE	Credits
-	2	**40**	**60**	1

Course Objectives

1. Apply the theoretical knowledge to experiments and acquire skills to handon.
2. Impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory.
3. Apply various instrumental methods to correlation to theory and to improve understanding of theoretical concepts.
4. Estimate the water quality analysis.
5. Estimation of purity of materials.

Course Outcomes: Students will be able to

1. Knowing of the hardness and alkalinity of sample water. (Analysis)
2. Measure the amount of a substance in a given solution by conductometry, potentiometry and P^H metry (Application)
3. Analysis of physical properties like surface tension and viscosity. (Analysis)
4. Analysis of about rate of reactions and rate constant information (Knowledge)
5. Importance of absorption of light by substance in analysis. (Knowledge, Analysis)

PERMANGANOMETRY

1. Estimation of Ferrous ion

DICHROMETRY

2. Estimation of Ferrous ion

WATER ANALYSIS

3, Determination of Total hardness of water by EDTA method.
4. Determination of Carbonate and Bicarbonate Alkalinity.

CONDUCTANCE MEASUREMENTS

5. Estimation of Strong acid with strong base (HCl Vs NaOH)
6. Estimation of weak acid with strong base (CH3COOH Vs NaOH)
7. Estimation of Mixture of Acids with Strong base (Hcl+CH3COOH) Vs NaOH

POTENTIOMETRIC MEASUREMNETS

8. Estimation of HCl
9. Estimation of Ferrous ion

P^H METRY

4. Determination of P^H of solution using glass electrode

SYNTHESIS OF A DRUG MOLECULE

5. Synthesis of Paracetamal.

COLOROMETRY

6. 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
S25ES111AD	PROGRAMMING FOR PROBLEM SOLVING 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 be demonstrated 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 (Common to all Branches)						Core
Prerequisite	Contact Hours per week				CIE	SEE	Credit
	L	T	D	P			
-	-	-	-	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:

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 Black Swan, 2018.

Course Code	Course Title						Core / Elective
S25ES911ME	**ENGINEERING GRAPHICS LAB (AI&DS, AI&ML, CME, CSE, ECE, EEE, IT)**						**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, Projections of solids in simple position.	2

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
S25ES112AD	IT WORKSHOP (Skill Course)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
_	-	-	-	2	40	60	1

Course Objectives:

1. IT Workshop is a practical learning environment where students can gain hands-on experience with various computer hardware, IT technologies and tools.
2. To extend student's knowledge in basics of computers hardware and Software.
3. To enable students to understand the operating systems Windows /Linux and Installation
4. To enable students to understand and practice documentation tools MS Word/ Latex.
5. To enable students to understand and practice presentation tools Power Point.
6. To enable students, understand and practice accounting tools MS Excel

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

1. Identify and understand the function of hardware and software components.
2. Install and configure different operating systems (Windows, Linux).
3. Develop skills in creating and maintaining documentation.
4. Designing and developing presentations.
5. Demonstrate and compute the data using Spread Sheet.

List of Experiments:

Week – 1:

a) Identify the peripherals of a computer, components in a CPU and its functions.

b) Draw the block diagram of the CPU along with the configuration of each peripheral.

c) Lab instructors should need to show through the video which shows the process of assembling a PC.

Week – 2:

a) Lab instructors should explain software, Application software and System software and functionality

b) Lab instructors should explain the installation of MS-Windows and Unix/Linux operating systems.

c) Lab instructors should need to show through the video which shows the process of installation of Window and Unix/Linux operating systems.

Week – 3:

a) Students must present a poster by describing various hardware compotes and software with applications.

b) Lab instructors should verify the work and follow it up with a Viva

Week – 4:

a) To create, save, open, edit, and manage documents.

b) To format the text including font selection, size, color, and text alignment.

c) To add and customize headers and footers, including page numbers and dates.

Week – 5:

a) To insert Bullets and Numbering, Cell alignment, Hyperlink, Symbols, Spell Check.

b) To insert and format tables, formatting table columns, rows and alignment data.

c) To insert, format, and manipulate images, shapes, and other graphics within a document.

Week – 6:

a) Student must create a documentation about computer hardware, software with images

b) Student must design time table for the class work and resume

c) Lab instructors should verify the work and follow it up with a Viva.

Week – 7:

a) To create, save, open, edit, and manage power point presentation.

b) To format the presentation including font selection, size, color, and text alignment.

c) To add and customize headers and footers, including page numbers and dates.

Week – 8:

a) To insert Bullets and Numbering, Cell alignment, Hyperlink, Symbols, Spell Check.

b) To insert and format tables, formatting table columns, rows and alignment.

c) To insert, format, and manipulate images, shapes, and other graphics within a presentation.

Week – 9:

a)Students must prepare and present power point presentation with 10 slides

b) Lab instructors should verify the work and follow it up with a Viva.

Week – 10:

a) To apply data analysis tools sorting, filtering, conditional formatting, and data validation.

b) To demonstrate how to create and format various types of charts and graphs to visualize data.

c) To introduce the basics of creating and using macros to automate repetitive tasks.

Week – 11:

a) To create, save, open, edit and manage Excel workbooks and Worksheets.

b) To enter, edit, and format data efficiently in cells, rows, and columns in Worksheets.

c) To introduce basic formulas and functions for calculations, such as SUM, AVERAGE, IF

Week – 12:

a)Students must prepare Excel workbooks and Worksheets for SSC and Inter marks

c) Lab instructors should verify the work and follow it up with a Viva.

TEXT BOOKS:

1. Alan Clements, Principles of Computer Hardware, Oxford University Press India, Fourth Edition, 2013.
2. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
3. Richard Peterson, Linux: The Complete Reference, McGraw Hill Education Sixth Edition, 2017.
4. Dr. S.B. Kishor, Computer Applications (Ms-Office), Das Ganu Prakshan Nagapur (India)

REFERENCES BOOKS:

1. Ron White, How Computers Work: The Evolution of Technology, Que Publishing; Tenth Edition, 2014.
2. David Reed,A Balanced Introduction to Computer Science, Pearson, Third Edition, 2010.
3. Steven Holzner, PHP: The Complete Reference, McGraw Hill Education, 2017.

AI&DS: SEMESTER-II

S.No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wks	CIE	SEE	SEE Duration Hrs.	
Theory Courses										
1	S25BS202PH	Applied Physics	3	1	-	4	40	60	3	4
2	S25BS203MT	Probability, Statistics and Number System	3	1	-	4	40	60	3	4
3	S25ES902AD	Python Programming	2	-	-	2	40	60	3	2
4	S25ES202EE	Basics of Electrical and Electronics Engineering	3	1	-	4	40	60	3	4
Practical and Laboratory courses										
5	S25BS212PH	Applied Physics Lab	-	-	2	2	40	60	3	1
6	S25ES912AD	Python Programming Lab	-	-	4	4	40	60	3	2
7	S25ES912ME	Engineering Workshop	-	-	4	4	40	60	3	2
8	S25ES212EE	Basics of Electrical and Electronics Engineering Lab	-	-	2	2	40	60	3	1
9	S25PW911AD	Design Thinking and IDEA Lab (Skill Course)	-	-	2	2	50	-	-	1
Total			**11**	**03**	**14**	**28**	**370**	**480**		**21**

Subject Code: S25BS202PH

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN

(Autonomous)

ABIDS, HYDERABAD - 500001.

APPLIED PHYSICS

SYLLABUS FOR B.E I & II SEM

(With effect from the Academic year 2025-2026)

(Common to CSE, IT, AI&DS and CME)

Instruction:	4L hours per week
Duration of Semester End Exam:	3 hours
Semester End Exam:	60 marks
Continuous Internal Evaluation:	40 marks
Credits:	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

www.sathyabamauniversity.ac.in/uploads/notes/note_1437661719.pdf

Course Code	Course Title						Core/ Elective
S25BS203MT	**Probability, Statistics& Number System (CSE, IT, AI&ML, AI&DS & CME)**						**Core**
	Contact Hours per Week						
Prerequisite	L	T	D	P	CIE	SEE	Credits
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
S25ES902AD	PYTHON PROGRAMMING						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
_	2	-	-	-	40	60	2

Course Objectives:

1. To learn to solve problems using Python conditionals and loops.
2. To define Python functions and use function calls to solve problems.
3. To use Python data structures – lists, tuples, dictionaries to represent complex data.

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

1. Understand and apply fundamental Python programming concepts including syntax, control structures, and basic data types.
2. Utilize Python's built-in data structures such as lists, tuples, sets, and dictionaries for effective data manipulation.
3. Design and implement modular programs using functions, recursion, and Python modules.
4. Implement exception handling and perform file operations using Python.
5. Apply Python libraries like NumPy and Pandas for data analysis and manipulate data efficiently.
6. Visualize data using Matplotlib to interpret and communicate information effectively through graphical plots.

UNIT I:

Python overview: History of python, python features, python installation and Local Environment Set-up, python basic syntax, Python Syntax compared to other programming languages

The print statement, Comments, Python Keywords and Data Types, variables and constants, operators and expressions, Type conversions, Simple Input & Output, Simple Output Formatting.

Indentation, The If statement and its' related statement, An example with if and it's related statement, the while loop, the for loop, the range statement, Break &Continue, Assert, single statement suites, pass statement, iterator and generator

UNIT II

Tuples, Named Tuples, Lists, Set. Frozen Sets, Dictionaries, Default Dictionaries, Ordered Dictionaries, Iterators and Iterable Operations and Functions, Copying Collections

Strings: Accessing values in string, updating string, escape charters, string special operators, string formatting operator, built-in string functions and methods, string module

UNIT III

Functions: Defining a function, calling a function, return statement, Pass by Reference vs Value, Function Arguments, Required Arguments, keyword Arguments, Default Arguments, Variable length Arguments, global Vs local variables. The Anonymous Functions, Function Documentations, Create a Module, Standard Modules.

UNIT IV

Errors, Exception handling with try, the except Clause with No Exceptions, handling Multiple Exceptions, Raising an Exception, Writing your own Exception

File handling Modes, Reading Files, Writing& Appending to Files, Handling File Exceptions The with statement

UNIT-V

Introduction to NumPy, Creating Arrays, Array dimensions, Array Indexing and Slicing, Array Operations, Array Methods and Functions,

Introduction to Pandas, Series and Data Frame basics, Creating Data Frames from lists, dicts, CSV, Reading/writing data (CSV, Excel), Basic data inspection, Indexing and selection, handling missing data: isnull(), fillna(), dropna(), Filtering rows and columns, Sorting and renaming, Grouping, Aggregation functions, Merging and joining Data Frames.

Matplotlib: Pyplot interface, plotting basics, adding titles, labels, legends, and grid, customizing color, line styles, markers, Subplots and multiple plots, plotting directly from Pandas, Saving plots, Case study

TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

2. Karl Beecher, "Computational Thinking: A Beginner'Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.

2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.

3. John V Guttag, Introduction to Computation and Programming Using Python: With Applications to Computational Modelling and Understanding Data'', Third Edition, MITPress.

Online Resources:

NPTEL Course— The Joy of Computing using Python (Sudarshan Iyengar)

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

Course Objectives

1. To provide an understanding of basics in Electrical Circuits.
2. To understand the characteristics of diode and its applications.
3. 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.	4

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.

Subject Code: S25BS212PH

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(Autonomous)
ABIDS, HYDERABAD - 500001.
APPLIED PHYSICS LAB
SYLLABUS FOR B.E I & II SEM
(With effect from the Academic year 2025-2026)
(Common to CSE, IT, AI&DS & CME)

Instruction:	2 hours per week
Duration of Semester End Exam:	3 hours
Semester End Exam:	60 marks
Continuous Internal Evaluation:	40 marks
Credits:	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
S25ES912AD	PYTHON PROGRAMMING LAB						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	0	0	0	2	40	60	2

Course Objectives:

1. The programming skills in Python.
2. The Object-oriented programming skills in Python.
3. Familiarize students with Python libraries used in data processing

Course Outcomes: After completing this course, the student will be able to:

1. Write, execute, and debug basic Python programs using variables, data types, operators, control structures, and standard input/output functions.
2. Develop and apply user-defined functions, recursion, and string-handling techniques to solve algorithmic problems.
3. Manipulate and apply operations on core Python data structures such as lists, tuples, sets, and dictionaries.
4. Read, write, and process data from files, and implement robust exception handling techniques.
5. Use NumPy and Pandas libraries to perform data manipulation, statistical analysis, and structured data operations.
6. Visualize data using Matplotlib and Pandas to interpret patterns, trends, and summaries implement solutions to real-world problems using case studies.

1. **Introduction to Python Programming:**
    1. Running instructions in Interactive interpreter and a Python Script.
    2. Raise Indentation Error and Correct it
    3. Compute distance between two points taking input from the user
    4. Two numbers and perform all arithmetic operations.
       display the following information: Your name, Full Address, Mobile Number, College Name, Course Subjects
2. **Decision making and loops**
    1. Checking whether the given number is an even number or not.
    2. Find the largest three integers using if-else
    3. To read a number and display the corresponding day using if_elif_else?
    4. Receives a series of positive numbers and displays the numbers in order and their sum using a while loop that asks the user for a number, and prints a count down from that number to zero.
3. **Functions and Recursion**
    1. Write a function to find mean, median, mode for the given set of numbers in a list

2. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
3. To print Fibonacci Sequence up to given number n
4. To find GCD of two integers
5. To display a prime number from 2 to n.
6. Functions that accept a string as an argument and return the number of vowels and consonants that the string contains

4. **Strings & List**

1. To check whether the given string is palindrome or not.
2. To remove the nth index character from a nonempty string
3. To Create a list and perform the following methods 1) insert () 2) remove () 3) append () 4) len() 5) pop() 6) clear()

   to remove duplicates from a list

5. Tuples & Dictionaries

1. To Create a dictionary, apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4) change values
2. To count the numbers of characters in the string and store them in a dictionary data structure
3. To combine lists that combine these lists into a dictionary.

6. **Files**

1. To write a series of random numbers in a file from 1 to n and display.
2. To write the content in a file and display it with a line number followed by a colon
3. To display a list of all unique words in a text file
4. To analyse the two text files using set operations
5. To print each line of a file in reverse order.
6. To count the frequency of characters in a given file.

7. **Exceptions**

1. Read two numbers n1 and n2. Write a function to compute n1/n2 and use try/except to catch the exceptions.
2. To detect and handle the exception while solving the quadratic equation.
3. To handle the run time errors while doing file handling operations.
4. To create and raise user defined exceptions.

8. **Numpy**

    1. Write a basic array of operations on a single array to add x to each element of array and subtract y from each element of array.
    2. Write a program to add, subtract and multiply two matrices
    3. Create multi-dimensional arrays and find its shape and dimension
    4. Append data vertically and horizontally
    5. Apply indexing and slicing on array

9. **Numpy-3**

    1. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation
    2. Dot and matrix product of two arrays
    3. Compute the Eigen values of a matrix
    4. Compute the rank of a matrix
    5. Compute the determinant of an array
    6. Perform Sorting, Searching and Counting using Numpy methods.

10. **Pandas**

    1. Create a Series using a list and a NumPy array.
    2. Create a Data Frame from a dictionary of lists.
    3. Load a CSV file (e.g., students.csv) and display the first and last 5 rows, show column names, data types, and shape, describe basic statistics using describe ().
    4. To handle missing values and perform group-by operations.

11. **Matplotlib**

    1. To visualize data using basic plotting functions.
    2. To explore subplots, histograms, and plotting from Pandas.

12. **Case Study**

    1. **Sales Data Analysis:** Load CSV, clean data, group by region, visualize revenue trends.
    2. **Student Performance Dashboard:** Analyze grades, attendance, department-wise performance, visualize in charts.
    3. **COVID-19 Tracker:** Use publicly available CSV data to track and visualize cases by date and country.

TEXT BOOKS:

1. Monu Singh Rakesh K. Yadav, Srinivas Arukonda "Zero To Mastery In Python Programming ", Vayu Education of India, 2021
2. Martin C. Brown," PYTHON: The Complete Reference", McGraw-Hill, 2018
3. Allen Downey**, "**Learning with Python", Dreamtech Press; 1st edition , 2015

REFERENCE BOOKS

1. Wesley J Chun," Core Python Applications Programming", Prentice Hall, 2012.
2. R. Nageswara Rao , "Core Python Programming" Dreamtech Press India Pvt Ltd 2018.
3. Allen B Downey," Think Python", O'Reilly, 2012.

Online Resources:

1. NPTEL Course: Python for Data Science Instructor: By Ragunathan Rehgasamy | IIT Madras https://nptel.ac.in/courses/106106212

Course Code	Course Title						Core/Elective
S25ES912ME	ENGINEERING WORKSHOP AI&DS, AI&ML, CME, CSE, ECE, EEE, IT)						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 and demonstration. 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 Publications, 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
S25ES113EE	**Basic Electrical & Electronics Engineering Lab (Common to IT, AIDS, CME & CSE (AIML))**						**Core**
	Contact Hours per Week						
Prerequisite	L	T	D	P	CIE	SEE	Credits
S25ES103EE	-	-	-	2	**40**	**60**	1

Course Objectives

1. To impart the practical knowledge and analysis of on electrical circuits and theorems.
2. To understand the characteristics of diodes and transistor configurations.
3. To understand the design of amplifiers.

Course Outcomes

1. Ability solves different circuits by using theorems.
2. Ability to analyze characteristics of Diodes.
3. Ability to analyze characteristics of Transistors.
4. Ability to design different amplifier circuits.

Suggested List of Laboratory Experiments/Demonstrations:

1. Verification of Mesh and Nodal analysis.
2. Verification of KVL and KCL.
3. Verification of Superposition theorem.
4. Verification of Thevenin's and Norton's theorems (with DC excitation)
5. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification of phase differences between current and voltage and Power factor calculation.
6. CRO –Measurements such as amplitude, frequency and phase using function generator.
7. Characteristics of Semiconductors diode (Ge, Si and Zener)
8. Full-wave rectifier with and without filters.
9. Static characteristics of BJT – Common Emitter.
10. Transistor as a Switch.
11. Common Emitter Amplifier.

Note: Minimum eight experiments should be conducted in the semester

Contents beyond the Syllabus:

1. Design of differentiator and integrator using OP-AMPs.
2. Measurement of 3-phase power using Two-wattmeter method.

Suggested Reading:

1. Maheshwari and Anand, *Laboratory Experiments and PSPICE Simulations in Analog Electronics,* 1st edition, Prentice Hall of India, 2006.
2. David Bell A., *Laboratory Manual for Electronic Devices and Circuits,* Prentice Hall of India, 2001.

Course Code	Course Title						Core/ Elective
S25PW911AD	DESIGN THINKING AND IDEA LAB						Core
	Contact Hours per Week				CIE	SEE	CREDITS
	L	T	D	P			
	0	0	-	2	50	-	1

COURSE OBJECTIVE(S):

1. Learn all the skills associated with the tools and inventory associated with IDEA lab under one roof, for conversion of an idea into a prototype.
2. Emphasis is to be on Hardware design and design with interfacing simulation software.
3. Emphasize is on skills to build design of an application

Course Outcomes:

1. Explain the stages and importance of Design Thinking.
2. Apply empathy techniques to understand user needs.
3. Generate problem statements and ideate innovative solutions.
4. Create both digital and physical prototypes using suitable tools.
5. Demonstrate communication and collaboration in team projects.
6. Analyze and reflect on user feedback for iterative improvement.

List of Experiments:

Week 1: Introduction to Design Thinking

- **Objective:** Understand the five stages of the Design Thinking process.
- **Activities:** Define each stage; discuss real-world applications.
- **Outcome:** Students explain Design Thinking and identify each stage.

Week 2: Empathize Phase

- **Tools:** 5-Why's, Conflict of Interest, Customer Journey Mapping (CJM)
- **Activity:** Create a persona, conduct empathy interviews, and build a CJM.
- **Outcome:** Students develop user personas and journey maps.

Week 3: Ideation using HMW

- **Objective:** Practice ideation tools like HMW (How Might We).
- **Activity:** Frame problem statements and generate 2-3 HMW questions.
- **Outcome:** Students formulate clear design challenges.

Week 4: Service Blueprinting

- **Objective:** Create a service blueprint to visualize user interaction.
- **Activity:** Extend CJM to identify key touchpoints.
- **Outcome:** Students analyze back-end and front-end user interactions.

Week 5: Prototype - Time Management App

- **Tools:** Paper sketches, Figma

- **Activity:** Create low-fidelity prototypes based on earlier insights.
- **Outcome:** Students demonstrate user-centric design through prototypes.

Week 6: Product Recommendation Prototype

- **Tools:** Marvel POP or Figma
- **Activity:** Design a mobile app prototype for product recommendations.
- **Outcome:** Students apply UI/UX principles to build a prototype.

Week 7: 3D Toy Prototype for Kids

- **Tools:** Tinkercad or Fusion 360
- **Activity:** Develop a physical toy model addressing a child's need.
- **Outcome:** Students design physical products using CAD tools.

Week 8: Informative Web Page on Design Thinking

- **Tools:** HTML
- **Activity:** Create a static page explaining the DT stages.
- **Outcome:** Students demonstrate content structuring and presentation.

Week 9: Interactive Web Page (HTML, CSS, JS)

- **Objective:** Show DT in action with interactivity.
- **Activity:** Build a webpage that allows user interaction (e.g., quiz, visual DT map).
- **Outcome:** Students understand front-end development.

Week 10: Mobile App Prototype using MIT App Inventor

- **Activity:** Develop a basic app based on DT approach.
- **Outcome:** Students create working mobile app prototypes.

Week 11: AI-Based Prototype with No-Code Tools

- **Tools:** Teachable Machine, Lobe, or similar
- **Activity:** Design an AI-based solution using user input.
- **Outcome:** Students explore AI without deep coding.

Week 12: Real-World DT Project using Arduino & Tinkercad

- **Activity:** Teams identify a local problem, empathize with users, ideate, prototype, and simulate using Arduino.
- **Outcome:** Complete Design Thinking cycle applied to a physical project.

REFERENCE BOOKS:

1. Make: Electronics: Learning Through Discovery." by Charles Platt
2. AICTE's Prescribed Textbook: Workshop/Manufacturing Practices (with Lab Manual), Khanna Book Publishing.
3. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam," Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.
4. Kathryn McElroy,"Prototyping for Designers: Developing the best Digital and Physical Products",O'Reilly,2017.
5. Micliacl G. Luchs, Scott Swan , A bbie Griffin, "Design Thinking — New Product Essentials from PDMA",Wiley,2015.
6. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.