FACULTY OF ENGINEERING
Scheme of Instructions
For
Four Year Degree Programme of Bachelor of

Engineering (B.E)

in
Computer Science and Engineering
Artificial Intelligence and Machine Learning

(With effect from the academic year 2025-26) (Approved by College Academic Council on 05-08-2025)

Empower Women – Impact the World

Department of Computer Science and Engineering (Artificial Intelligence and Machine Learning)

Stanley College of Engineering and Technology for Women (Autonomous)

(Affiliated to Osmania University)

(Accredited by NAAC with "A" Grade)

Abids, Hyderabad – 500 001, Telangana.

VISION OF THE DEPARTMENT

To empower girl students in the field of Artificial Intelligence and Machine Learning through cutting-edge education, innovation, and ethical practices enabling them to make meaningful contributions to technology and society.

MISSION OF THE DEPARTMENT

M1: Provide a strong foundation in Artificial Intelligence and Machine Learning through a rigorous curriculum, hands-on learning, and exposure to current industry trends and research.

M2: Cultivate technical expertise, critical thinking, and problem-solving skills while fostering confidence and resilience to excel in professional and academic pursuits.

M3: Instill values of ethics, empathy, and leadership in students, encouraging them to develop responsible AI solutions that positively impact society.

M4: Inspire students to become thought leaders and change-makers who harness AI technologies to address global challenges and advance societal well-being.

Program Educational Objectives (PEOs)

Graduates of the B.E. in Computer Science and Engineering (Artificial Intelligence and Machine Learning) program will:

PEO1: Apply foundational knowledge in computer science, artificial intelligence, and machine learning to solve real-world problems, pursue successful careers in industry, research, or entrepreneurship, and remain competitive in a rapidly evolving technological landscape.

PEO2: Engage in lifelong learning through higher education, certifications, research, and innovation to keep pace with technological advancements in AI, ML, and related fields.

PEO3: Practice engineering with ethics, empathy, and a sense of social responsibility, designing AI solutions that are inclusive, transparent, and beneficial to society.

PEO4: Lead and collaborate effectively in multidisciplinary teams, and emerge as empowered professionals and change-makers contributing to societal and organizational growth

Program Outcomes (POs)

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduates will be able to design, develop, and deploy intelligent systems using core concepts of Artificial Intelligence, Machine Learning, Data Science, and related technologies to solve complex and data-driven problems.

PSO2: Graduates will apply AI/ML knowledge with an understanding of ethical, legal, and societal implications, promoting fairness, accountability, and transparency in intelligent system development for the betterment of society.

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

Induction Program

S25MC901CS Induction Program (Mandatory)	3 weeks' duration
Induction program for students to be offered right at the start of the first year	1. Physical Activity 2. Creative Arts 3. Universal Human Values-I 4. Literary 5. Proficiency Modules 6. Lectures by Eminent People 7. Visits to local Areas 8. Familiarization to Dept./Branch & Innovations

B. E . 4 Year (8 semesters) Regular Programme in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Course Structure
(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester I											
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25BS101MT	Linear Algebra & Calculus	3	1		4	40	60	3	4
2	S25ES103EE	Basic Electrical Electronics Engineering	3	1		4	40	60	3	4
3	S25BS102PH	Applied Physics	3	1		4	40	60	3	4
4	S25ES101AM	Programming for Problem Solving	3			3	40	60	3	3
Practical/Laboratory Courses										
5	S25BS112PH	Applied Physics Lab			2	2	40	60	3	1
6	S25ES111AM	Programming for Problem Solving Lab			4	4	40	60	3	2
7	S25ES912ME	Engineering Workshop			4	4	40	60	3	2
8	S25PW911AM	Design Thinking and IDEA Lab			2	2	40	60	3	1
			12	3	12	27	320	480	24	21

B. E. 4 Year (8 semesters) Regular Programme in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Course Structure
(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester II										
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25BS204MT	Probability & Statistics	3	1		4	40	60	3	4
2	S25ES902AM	Python Programming	3			3	40	60	3	3
3	S25BS901CH	Engineering Chemistry	3	1		4	40	60	3	4
4	S25HS901EG	English	2	-		2	40	60	3	2
5	S25HS902EG	Universal Human Values	2			2	40	60	3	2
Practical/Laboratory Courses										
6	S25ES912AM	Python Programming Lab			2	2	40	60	3	1
7	S25BS911CH	Engineering Chemistry Lab			2	2	40	60	3	1
8	S25ES911ME	Engineering Graphics			4	4	40	60	3	2
9	S25ES212AM	IT workshop			2	2	40	60	3	1
10	S25HS911EG	English Lab			2	2	40	60	3	1
			13	2	12	27	400	600	30	21

B. E. 4 Year (8 semesters) Regular Programme in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Course Structure
(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester III										
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25ES901AM	Data Structures	3			3	40	60	3	3
2	S25PC302AM	Data Visualization and Analytics	3			3	40	60	3	3
3	S25PC303AM	Object Oriented Programming through JAVA	3			3	40	60	3	3
4	S25PC304AM	Discrete Mathematics & Graph Theory	3	-		3	40	60	3	3
5	S25ES305AM	Computer System Design	3	1		4	40	60	3	4
6	S25MC902CH	Environmental Science	2			2	40	60	3	0
Practical/Laboratory Courses										
7	S25PC311AM	Object Oriented Programming through JAVA			3	3	40	60	3	1.5
8	S25PC312AM	Data Visualization and Analytics Lab			3	3	40	60	3	1.5
9	S25ES911AM	Data Structures Lab			2	2	40	60	3	1
			17	1	8	26	360	540	27	20

B. E. 4 Year (8 semesters) Regular Programme in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Course Structure
(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester IV										
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25PC401AM	Database Management System	3			3	40	60	3	3
2	S25PC402AM	Theory of Computation & Compiler Design	3	1		4	40	60	3	4
3	S25PC403AM	Operating Systems	3			3	40	60	3	3
4	S25PC404AM	Artificial Intelligence	3	-		3	40	60	3	3
5	S25BS406MT	Mathematics-III	4			3	40	60	3	3
6	S25MC901XX	Indian Constitution	2			2	40	60	3	0
Practical/Laboratory Courses										
7	S25PC411AM	Database Management System Lab			3	3	40	60	3	1.5
8	S25PC412AM	Operating Systems Lab			3	3	40	60	3	1.5
9	S25PC413AM	Full Stack Development Lab		2	2	4	40	60	3	3
10	S25ES912AM	Internship-1	(to be evaluated in 5th semester. To be carried out in summer after 4th semester))							
			18	3	8	29	360	540	27	22

B. E . 4 Year (8 semesters) Regular Programme in Computer Science and Engineering (Artificial Intelligence and Machine Learning)

Course Structure

(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester V										
			Scheme of Instruction				Scheme of Examination			Credits
S.NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	DURATION IN HOURS	Credits
Theory Courses										
1	S25PC501IAM	Machine Learning	3			3	40	60	3	3
2	S25PC502AM	Algorithm Analysis and Design	3			3	40	60	3	3
3	S25PC503AM	Computer Networks	3			3	40	60	3	3
4	S25PC504AM	Software Engineering	3			3	40	60	3	3
5	S25PC505 AM	Soft Computing	3			3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC511AM	Machine Learning Lab			3	3	40	60	3	1.5
7	S25PW913AM	Mini Project			4	4	40	60	3	2
8	S25PC512AM	Computer Network Lab			3	3	40	60	3	1.5
9	S25PW912AM	Internship -1 (to be evaluated in 5th semester. To be carried out in summer after 4th semester))					50	-	3	1
			15	0	10	25	370	480	27	21

B. E. 4 Year (8 semesters) Regular Programme in Computer Science and Engineering (Artificial Intelligence and Machine Learning)

Course Structure

(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester VI											
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25HS901BM	Managerial Economics and Financial Analysis	3	1		4	40	60	3	4
2	S25PC601AM	Cloud Computing	3			3	40	60	3	3
3	S25PC602AM	Natural Language Processing	3			3	40	60	3	3
4	S25PC603AM	Deep Learning	3			3	40	60	3	3
5	S25PE60XXX	Professional Elective – 1	3			3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC611AM	Natural Language Processing Lab			3	3	40	60	3	1.5
7	S25HS912EG	Advanced Communication Skill			2	2	40	60	3	1
8	S25PC612AM	Deep Learning and Lab			3	3	40	60	3	1.5
9	S25PW914AM	Internship-2	The students have to undergo a Internship-2 of 6 week duration after VI-Semester SEE							
			15	1	8	24	320	480	24	20

B. E. 4 Year (8 semesters) Regular Programme in Computer Science and Engineering (Artificial Intelligence and Machine Learning)

Course Structure

(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester VII											
S. NO	Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25PC701AM	Generative AI	3			3	40	60	3	3
2	S25PE70XAM	Professional Elective – 2	3			3	40	60	3	3
3	S25PE70XAM	Professional Elective – 3	3			3	40	60	3	3
4	S25PE70XAM	Professional Elective – 4	3			3	40	60	3	3
5	S25OE90XXX	Open Elective-1	3			3	40	60	3	3
Practical/Laboratory Courses										
6	S25PC711AM	Generative AI Lab			3	3	40	60	3	1.5
7	S25PE71XAM	Professional Elective Lab			3	3	40	60	3	1.5
8	S25PW916AM	Project work -1			6	6	50		3	3
9	S25PW915AM	Internship -2 (to be evaluated in 7th semester. To be carried out in summer after 6th semester))					50		3	2
			15		12	27	380	420		23

B. E. 4 Year (8 semesters) Regular Programme in Computer Science and Engineering (Artificial Intelligence and Machine Learning) Course Structure

(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester VIII										
S.NO	Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	CONTACT HOURS	CIE	SEE	SEE DURATION IN HOURS	Credits
Theory Courses										
1	S25OE90XXX	Open Elective-2	3			3	40	60	3	3
Practical/Laboratory Courses										
8	S25 PW917AM	Project work -2			16	16	50	100	3	8
			3		16	19	90	160	6	11

PC: Professional Course **PE:** Professional Elective **MC:** Mandatory Course

PW: Project Work **L:** Lecture **T:** Tutorial **P:** Practical **D:** Drawing

AU: Audit Course CIE: Continuous Internal Evaluation, **SEE:** Semester End Examination

Note:

1.Each contact hour is a Clock Hour

2.The duration of the practical class is two clock hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Professional Electives

PE-1	PE-2	PE-3	PE-4
Big Data Analytics S25PE601AM	Machine Vision S25PE701AM	Reinforcement Learning S25PE706AM	Text & speech Analysis S25PE70BAM
Game Programming S25PE602AM	Robotic Process Automation S25PE702AM	Augmented Reality & Virtual Reality S25PE707AM	Large language Models and Their Applications S25PE70CAM
Statics for Machine Learning S25PE603AM	AI for Cyber Security S25PE703AM	Responsible AI S25PE708AM	Quantum Computing S25PE70DAM
UI&UX Design S25PE604AM	AI in Finance S25PE704AM	AI in Gaming S25PE709AM	Autonomous Drones S25PE70EAM
Soft Computing S25PE605AM	Advanced Machine Learning S25PE705AM	AI in Healthcare S25PE70AAM	Evolutionary Computing S25PE70FAM

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

Course Objectives

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

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
S25ES103EE	**Basic Electrical and Electronics Engineering (Common to all CSE allied Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Basics of Matrices, differentiation and integration.	3	1	-	-	**40**	**60**	4

Course Objectives

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

CO Code	**Course Outcomes**
CO1	To analyze the electrical circuits using different theorems.
CO2	To understand the basic principles of Electrical Machines.
CO3	To analyze the AC circuits in terms of different parameters
CO4	To Study Diode characteristics and applications as rectifiers and filters.
CO5	To analyze the characteristics of BJT and its applications problems

Unit I – DC Circuits

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

Unit II – AC Circuits

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

Unit III – Qualitative Analysis of Electrical Machines

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

Unit IV – PN Junction Diode

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

Unit V – Transistors

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

Text Books:

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

Reference Books:

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

Course Code	Course Title						Core / Elective
S25BS102PH	**Applied Physics (Common to all CSE allied Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**40**	**60**	4

Course Objectives

1. 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.

Classify materials using band theory and explain how size-dependent properties of nanomaterials contribute to innovations in electronics, AI hardware, sensor technologies.

Unit-I: (10 periods)

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

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

Unit-II: (10 periods)

Introduction to Quantum Mechanics: Introduction, de-Broglie's concept – wave nature of particles (Debroglie wavelength), properties of wave function and its physical significance, Time independent and Time dependent schrodinger wave equations, Particle in a 1D box.

Nano materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials – Bottom up methods (sol-gel & CVD) and Top down method (ball milling), Basic ideas of carbon nanotubes, Applications of nano materials.

Unit-III: (10 periods)

Band theory of solids: Classical free electron theory and its limitations, Band theory – Kronig penny model (qualitative treatment), Energy bands in solids, Classification of materials as conductors, semiconductors and insulators.

Semiconductor Physics: Introduction, Intrinsic and extrinsic semiconductors, Concept of a hole, formation of valency band and conduction band, carrier concentration and conductivity in intrinsic semiconductors, Fermi energy level in pure and impure semiconductors, formation of P-N junction diode, Diode Equation and its I-V characteristics, Photo cell, Solar cell, Thermistor and their applications.

Unit-IV: (10 periods)

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

Unit-V: (10 periods)

Magnetic materials: Introduction, Classification of magnetic materials – Dia, para, ferro, antiferro and ferri magnetic materials their properties and ferrites applications, Weiss molecular field theory of ferro magnetism, Domain theory, Hysteresis curve, Soft and hard magnetic materials and their applications.

Superconductivity: Introduction, General properties of superconductors, Meissner effect, Josephson effect, BCS theory (qualitative), Type I and Type II superconductors, Applications of superconductors.

Text Books:

1. B. K. Pandey and S. Chaturvedi, Engineering physics, Cengage Publications.

2. D. K Bhatacharya and Poonam Tandon, Engineering Physics, Oxford University Press.

3. M. Armugam Materials Science, Anuradha Publications.

4. G. Aruldhas, Quantum Mechanics, 2nd Edition, Eastern Economy Edition.

5..S.O.Pillai, Solid State Physics, 4th Edition, New Age International Publishers.

6. Charles P Poole, Jr., Frank J. Owens, Introduction to NanoTechnology, Wiley-India.

7. S. Salivahanan, Basic Electronics, Mc. Graw Hill publications.

Recommended Books:

1. A. J. Dekkar, Solid State Physics, Mac Millan India Ltd.

2. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition.

3. Feynman P Richard,The Feynman Lectures on Physics, 2nd Edition, Addison-Wesley..

4. Nano materials and their Applications, Book series, Springer.

Web links:

1. www.bietdvg.edu/media/department/PHY/data/learningmaterials/Module_III__IV_Lasers_Optical_fibers-1.pdf

2. hyperphysics.phy-astr.gsu.edu/hbase/electric/dielec.html

3. scholar.harvard.edu/files/david-morin/files/waves_quantum.pdf

4. www.nhcue.edu.tw/~jinnliu/proj/Device/Lecture01.pdf

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

Course Code	Course Title						Core / Elective
S25ES101AM	Programming for Problem Solving						Core
-	Contact Hours per Week				CIE	SEE	Credits
Pre Requisite	L	T	D	P			
-	3	-	-		40	60	3

Course Objectives

The course should enable the students to :

1. Understand programming skills using the fundamentals and basics of C Language.
2. Improve problem solving skills using arrays, strings, and functions.
3. Understand the dynamics of memory by pointers and study files creation process with access permissions.

Course Outcomes

1. Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats and describe operators and their precedence, associativity.
2. Understand and Apply branching and loop statements
3. Describe the concept of homogeneous derives data types, strings and functions.
4. Understand pointers, heterogeneous data types.
5. Describe the concept of file system.

UNIT - I INTRODUCTION

PROBLEM SOLVING: Introduction to computer based problem solving, Program design and implementation issues, Algorithms for problem solving: Simple problems based on number theory, Operations on ordered set of elements, Solving quadratic equations, Operations on matrices.

Introduction to C language: Computer languages, History of C, basic structure of C programs, 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;

UNIT - II ITERATIVE CONTROL STRUCTURES AND ARRAYS

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

Arrays : Concepts, one dimensional arrays, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi-dimensional arrays; Strings(character arrays): Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.

UNIT – III FUNCTIONS, STRUCTURES AND UNIONS

FUNCTIONS: Designing Structured Programs, Functions Basics, Standard Library Functions, User Defined Functions, Categories of Functions, Parameter Passing Techniques, Scope, Scope Rules, Storage Classes and Type Qualifiers, Recursion: Recursive Functions, Preprocessor Directives.

Structures: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, unions, bit fields, typedef, enumerations.

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 functions arguments, functions returning pointers, passing structures through pointers, self-referential structures.

Dynamic memory allocation: Basic concepts, library functions.

UNIT - V FILE HANDLING, SEARCHING AND SORTING 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.

Searching and Sorting: linear search, binary search, bubble sort.

Text Books :

1. Herbert Schildt, The Complete Reference C, 4th Edition, Tata McGraw-Hill, 2017.

2. Harsha Priya, R. Ranjeet, Programming and Problem Solving Through "C" Language,1st Edition, Fire Wall Media, 2015. (For Unit 1)

3. Balagurusamy E, Programming in ANSI C, 8th Edition, Tata McGraw-Hill,2019.

Reference Books :

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.

4. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.

5. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.

6. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

Course Code	Course Title						Core / Elective
S25BS112PH	APPLIED PHYSICS LAB						Core
	Contact Hours per Week				CIE	SEE	Credits
Pre Requisite	L	T	D	P			
-	-	-	-	2	40	60	1

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

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

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

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

LIST OF EXPERIMENTS

1. Determination of wavelength of laser using diffraction grating.
2. Determination of Numerical Aperture (NA) and Acceptance angle of an optical fiber and also to determine the power loss per meter of the cable.
3. To draw the I-V characteristics of P-N junction diode and to evaluate series resistance in forward and reverse bias conditions.

4. To draw the I-V characteristics of solar cell and to calculate fill factor.
5. To determine the constants A and B using Thermistor characteristics.
6. To find the value of energy gap of a given semiconductor.
7. To find the value of Plank's constant using photo cell.
8. To determine the Phase transition temperature of the given dielectric.
9. To draw the curve between the magnetic field and Intensity of magnetization for a given specimen and to find out Coercivity and Retentivity of the specimen.
10. Determination of carrier concentration, mobility and Hall co-efficient in a semiconductor using Hall Effect experiment.

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

Course Code	Course Title						Core / Elective
S25ES111AM	Programming for Problem Solving Laboratory						Core
	Contact Hours per Week				CIE	SEE	Credits
Pre Requisite	L	T	D	P			
-	-	-	-	4	40	60	2

Course Objectives:

The course should enable the students to:

1. Formulate problems and implement algorithms using C programming language.
2. Develop programs using decision structures, loops and functions.
3. Learn memory allocation techniques using pointers and use structured programming approaches for solving computing problems in the real world

Course Outcomes:

1.Understand the concept of basics of C, data types and variables.

2. Understand the concept of operators, precedence of operators, conditional statements and looping statements.

3. Explore the concept of strings, functions, recursive functions and differences between call by value and call by reference.

4. Explore the concept of storage classes, preprocessor directives, pointes and files.

5. Understand the concept of file handling functions, searching and sorting methods and real time applications of C.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	3	–	–	–	1	–	2	3	–
CO2	3	2	2	2	3	–	–	–	–	–	2	3	–
CO3	3	2	2	1	3	–	–	–	–	–	2	2	–
CO4	3	3	2	2	3	–	–	–	–	–	2	3	–
CO5	3	3	2	2	3	–	–	–	–	–	2	3	–

LIST OF EXPERIMENTS

Concept :Basic I/O,Operators

1. Write a C program to check and print a given number is even or odd using ternary operator.
2. Write a C program to calculate area and circumference of a circle.
3. Write a C program to solve given expression

Concept: Basic I/O,conditionalexecution,loops, Jump Statement

4. Write a C program to accept student roll,marks, calculate total,average and print grade of student.

5. Write a C program to print fibonoci series
6. Write a C program to check and print Armstrong Number
7. Write a C program to check and print Prime No.
8. Write a C program to add sum of only positive integers using continue statement.

Concept: Basic I/O,Conditionalexecution,loops, Arrays(integer 1D,2D)

9. Write a C program to print sum of integers of an 1D array.
10. Write a C program to perform matrix addition for a 2D array.
11. Write a C program to perform matrix multiplication of a 2D array.

Concept: Sub Programs:User Defined Functions,Recursion

12. Write a C program to perform different prototypes of user defined function. 13. Write a C program to perform factorial of given number using functions. 14. Write a C program to perform factorial of given number using recursive functions.

Concept: Strings

15. Write a C program to determine if the given string is a palindrome or not
16. Write a C program to apply inbuilt string functions

Concept :Structures and Unions:

17. Write a C program to apply Nested structures and array of strcutures.
18. Write a program to demonstrate structure and union.

Concept :Pointers

19. Write a C program to access 1D Array and 2D array using Pointers
20. Write a C program to concatenate two strings using pointers.
21. Write a C program to find the length of string using pointers.

Concept: Files ,Searching, Sorting

22. Write a C program to display the contents of a file.
23. Write a C program to copy the contents of one file to another.
24. Write a C program apply binary search.
25. Write a C program apply bubble sorting .

Text Books :

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.

Reference Books :

1. B. A. Forouzan, R. F. Gillberg, “C Programming and Data Structures”, Cengage Learning, India, 3rd Edition, 2014.
2. W. Kernighan Brian, Dennis M. Ritchie, “The C Programming Language”, PHI Learning, 2nd Edition, 1988.
3. YashavantKanetkar, “Exploring C”, BPB Publishers, 2nd Edition, 2003.
4. Schildt Herbert, “C: The Complete Reference”, Tata McGraw Hill Education, 4th Edition, 2014.
5. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.
6. Dey Pradeep, Manas Ghosh, “Computer Fundamentals and Programming in C”, Oxford University Press, 2nd Edition, 2006.
7. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.

Course Code	Course Title						Core/Elective
S25ES912ME	ENGINEERING WORKSHOP						Core
Prerequisite	Course hours per week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	40	60	2

Course Objectives:

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

Course Outcomes:

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

LIST OF EXPERIMENTS:

A.TRADE FOR EXERCISES:

1. **CARPENTRY**: Sawing and Grooving, T-lap joint and dove-tail joint.
2. **HOUSE WIRING**: Series wiring and parallel wiring by one way switch, two way switching for stair case light, tube light connections.
3. **SHEET METAL WORKING**: Open Scoop, Funnel, Rectangle tray and a cone.
4. **SOLDERING:** Solder basics 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 Publicstions,Kumbakonam,TN,2012.
2. K.C.John, "Mechanical Workshop" 2nd Edn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol.1, Asian Publishers,Edu., 1993.
4. G.S.Sawhney, "Mechanical Experiments and Workshop Practice", I.K.International Publishing house, New Delhi,2009.

Course Code	Course Title						Core/ Elective
SP25W111AM	Design Thinking and Idea Lab						project
	Contact Hours per Week				CIE	SEE	CREDITS
	L	T	D	P			
	0	0	-	2	40	60	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 , Abbie 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.

B. E . 4 Year (8 semesters) Regular Programme in
Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
Course Structure
(Applicable for the Batch admitted from the Academic Year 2025-26)

Semester II										
			Scheme of Instruction				Scheme of Examination			Credits
S. NO	Code	Course Title	L	T	D/P	CONTACT HOURS	CIE	SEE	DURATION IN HOURS	Credits
Theory Courses										
1	S25BS204MT	Probability & Statistics	3	1		4	40	60	3	4
2	S25ES902AM	Python Programming	3			3	40	60	3	3
3	S25BS901CH	Engineering Chemistry	3	1		4	40	60	3	4
4	S25HS901EG	English	2	-		2	40	60	3	2
5	S25HS902EG	Universal Human Values	2			2	40	60	3	2
Practical/Laboratory Courses										
6	S25ES912AM	Python Programming Lab			2	2	40	60	3	1
7	S25BS911CH	Engineering Chemistry Lab			2	2	40	60	3	1
8	S25ES911ME	Engineering Graphics			4	4	40	60	3	2
9	S25ES212AM	IT workshop			2	2	40	60	3	1
10	S25HS911EG	English Lab			2	2	40	60	3	1
			13	2	12	27	400	600		21

CourseCode	CourseTitle						Core/ Elective
S25BS204MT	**Probability, Statistics& Number System (CSE, IT, AI&ML, AI&DS, & CME)**						**Core**
Prerequisite	ContactHoursperWeek				CIE	SEE	Credits
	L	T	D	P			
Basic Statistics and Probability	3	1	-	-	**40**	**60**	4

Course Objectives

1. Understand the foundational principles of probability, statistics, and number systems relevant to intelligent systems and data analysis.

2.Apply appropriate statistical tools including correlation, regression, and distribution models to analyze real-world data.

3.Evaluate hypotheses and infer conclusions using various parametric and non-parametric tests.

4.Explore and utilize number theoretic concepts and real number construction in data security and algorithmic applications.

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

Unit I

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

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

Unit II

Introduction of Probability: Conditional Probability, Theorem of total probability, Baye's theorem and its applications, Random variables, Types of Random Variables – Discrete and Continuous random variables,

Probability mass function and Probability density function, mathematical expectations. Moment generating function. Joint Probability Distribution-marginal and conditional. (T2&T3)

Unit III

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

Unit IV

Test of hypothesis (Large sample and small sample):

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

Unit V

Number System:

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

TEXT BOOKS:

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

REFERENCES/SUGGESTED READING:

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

Course Code	Course Title						Core/Elective
S25ES902AM	**Python Programming**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**40**	**60**	**3**

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:

Upon completion of the course, students will be able to

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 Argument s, 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 DataFrame basics, Creating DataFrames 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 DataFrames,

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, 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: Third Edition, MIT Press

Course Code	Course Title						Core /Elective
S25BS0901CH	**ENGINEERING CHEMISTRY (Common to all Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	
	L	**T**	**D**	**P**			
-	**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 thehard water and treatment of water for drinking purpose.
3. Correlate the properties of polymeric materials with their internal structure and use for engineeringapplications.
4. Exposed to qualitative and quantitative parameters of chemical fuels.
5. Expose the techniques regarding spectroscopy and familiarizes Nano materials including Green chemistry.

Course Outcomes: Student will be able to

1. Apply the concept of electrode potential in identifying feasibility of electrochemical reaction: illustrate electroanalytical techniques and working of batteries.(Application).
2. Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosioncontrol 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 Spectroscopic techniques and examples of clean technology. (Knowledge, Application)

SYLLABUS:

UNIT – I: (10 Hrs) ELECTROCHEMISTRY & BATTERIES

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

Battery chemistry:Types of Batteries: Primary batteries: Zinc- Carbon Battery, Secondary Batteries: Lead –Acidbattery, Lithium Ion batteries, and their application.

Fuel cells: Concept of fuel cells, Construction, Working and Advantages of CH 3 OH – O 2 fuel cell.

UNIT II: (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. Water softening by ion exchange and Reverse Osmosis methods. Specification of potable water. Sterilization by chlorination.

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

UNIT III: (10 Hrs) ENGINEERING MATERIALS

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

Biodegradable polymers: Introduction- Preparation, Properties and Applications of Poly Lactic Acid.Conducting polymers: Introduction, classification. Mechanism of conduction in Poly Acetylene. Applications of conducting polymers

UNIT IV: (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 - Numericals.

Solid fuels: Coal-Ranking of Coal, Analysis of Coal: 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. Bio diesel: Sources of Biodiesel, Synthesis of Biodiesel (Trans esterification) - Applications of Biodiesel

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

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

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

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

.

Text Books:

1. P.C.Jain and M.Jain, Engineering Chemistry,Dhanapathi Rai publishing

2. Text Book of Engineering Chemistry 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, 7 th 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
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	Credits
	L	T	D	P			
-		-	-	-	40	60	

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 behavior (Knowledge) (Synthesis)
4. Develop and enrich interaction with nature. (Application)
5. Develop appropriate technologies and management patterns to create harmony in professional and personal life. (Synthesis)

SYLLABUS

UNIT–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 level.

UNIT– 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

UNIT – 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).

UNIT – 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.

UNIT – 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.

Text Books:

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

Course Code	Course Title						Core/Elective
S25ES912AM	**Python Programming Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-			**-**	**2**	**40**	**60**	**1**

Course Objectives

The students will try to learn:

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 a even number or not.
    2. find the largest three integers using if-else
    3. To read a number and display corresponding day using if_elif_else?
    4. receives a series of positive numbers and display the numbers in order and their sum

       using a while loop that asks the user for a number, and prints a countdown 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 prime number from 2 to n.

       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 n^{th} 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 combines these lists into a dictionary.

4. 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 frequency of characters in a given file.

5. 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 operation.
    4. To create and raise user defined exception.
6. Numpy
    1. write a basic array of operations on 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
7. 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 matrixi
    4. Compute the rank of a matrix
    5. Compute the determinant of an array
    6. Perform Sorting, Searching and Counting using Numpy methods.
8. Pandas
    1. Create a `Series` using a list and a NumPy array.
    2. Create a `DataFrame` 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.
9. Matplotlib'
    1. To visualize data using basic plotting functions.
    2. To explore subplots, histograms, and plotting from Pandas.
10. 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

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

Course Objectives

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

Course Outcomes: Students will be able to

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

List of Experiments

a) Introduction to Chemical Analysis

b) Techniques of Weighing

VOLUMETRIC ANALYSIS

PERMANGANOMETRY

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

DICHROMETRY

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

WATER ANALYSIS

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

INSTRUMENTAL ANALYSIS

CONDUCTANCE MEASUREMENTS

4. Preparation of Standard Oxalic Acid($H_2C_2O_4$) Solution, Standardization of NaOH, Estimation of Hcl.

5. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of CH_3COOH.

6. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of Hcl and CH3COOH.

POTENTIOMETRIC MEASUREMNETS

7. Preparation of Standard Oxalic Acid Solution, Standardization of NaOH, Estimation of Hcl.

8. Preparation of Standard Mohr's salt solution, Standardization of KMnO4 and Estimation of Ferrous ion.

P^H METRY

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

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

SYNTHESIS OF A DRUG MOLECULE

11. Synthesis of Paracetamal.

COLOROMETRY

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

Reference Books:

1. Senior Practical Physicla Chemistry, B.D.Khosla, A.Gjulati, V.C.Garg., (R.Chand and company, New Delhi 10^{th} 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
S25ES911ME	**ENGINEERING GRAPHICS**						**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.	2+2

	Line parallel to both the planes, line perpendicular to or inclined to one reference plane, Line inclined to both the reference planes.	
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
S25ES212AM	IT Workshop						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	0	0	0	2	40	60	1

Course Objectives: IT Workshop is a practical learning environment where students can gain hands-on experience with various computer hardware, IT technologies and tools.

1. To extend student's knowledge in basics of computers hardware and Software.
2. To enables students to understand the operating systems Windows /Linux and Installation
3. To enable students to understand and practice documentation tools MS Word/ Latex.
4. To enable student to understand and practice presentation tools Power Point.
5. 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 presentation.
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 need to explain 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:

4. Student must present poster by describing various hardware compotes and software with applications.

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

Week – 4:

9. To create, save, open, edit, and manage documents.
10. To formatting the text including font selection, size, color, and text alignment.
11. 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 formatting 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:

6. To insert Bullets and Numbering, Cell alignment, Hyperlink, Symbols, Spell Check.
7. To insert and format tables, formatting table columns, rows and alignment.
8. To insert, format, and manipulate images, shapes, and other graphics within a presentation.

Week – 9:

1. 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:

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.

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 BlackSwan, 2018.