



SASURIE
COLLEGE OF ENGINEERING
(Autonomous)
Vijayamangalam, Tiruppur - 638056



CURRICULUM AND SYLLABI

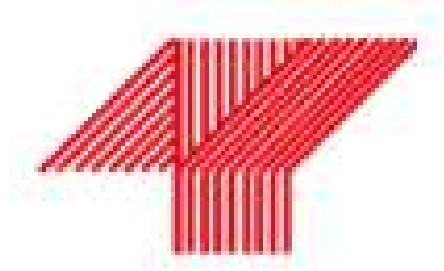
REGULATION 2026

**DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING
(CYBER SECURITY)**



SASURIE COLLEGE OF ENGINEERING

(Autonomous Institution Affiliated to Anna University, Chennai)



CURRICULUM AND SYLLABI – 2026

CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

(For the students admitted from the academic year 2026 - 2027)

BACHELOR OF ENGINEERING

IN

**COMPUTER SCIENCE AND ENGINEERING
(CYBER SECURITY)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(CYBER SECURITY)**

Vision and Mission of the Institute

Vision

To become a leading professional institution by offering high-quality education, fostering successful graduates with strong employability prospects, advancing sustainable research through ethical practices and empowering young minds to contribute to the nation's growth in Engineering, Technology and Management.

Mission

- To deliver high-quality education that empowers students with the knowledge, skills and ethical values necessary for success in Engineering, Technology and Management.
- To develop graduates with strong employability potential, fostering innovation, leadership and a commitment to continuous learning.
- To advance sustainable research and development that addresses real-world challenges and drives societal progress.
- To inspire and shape young minds into responsible professionals dedicated to contributing to the nation's growth and development.

Vision and Mission of the Department

Vision

To develop competent CyberSecurity professionals with global employability, entrepreneurial capability, and research orientation, contributing to technological advancement, rural empowerment, and social responsibility.

Mission

- To develop proficient CyberSecurity engineers by providing a state-of-the-art academic environment and an industry-driven curriculum aligned with emerging global needs.
- To encourage students to pursue entrepreneurship, higher education, and innovative research in Cyber Security with practical and societal relevance.
- To strengthen the department with a dedicated faculty team fostering creativity, technical excellence, and research in thrust areas of Cyber Security.
- To provide innovative and sustainable solutions to Cyber Security challenges through projects, industry collaboration, and engagement with society and professional bodies.

Program Outcomes (POs)

- **PO1: Engineering Knowledge** — Apply math, science, and engineering fundamentals to solve complex problems.
- **PO2: Problem Analysis** — Formulate and analyze complex engineering problems using first principles.
- **PO3: Design/Development of Solutions** — Design systems or components that meet specific needs with public health and safety in mind.
- **PO4: Conduct Investigations of Complex Problems** — Use research-based knowledge, experiments, and data analysis.
- **PO5: Engineering Tool Usage** — Select and apply modern IT and engineering tools and techniques.
- **PO6: The Engineer and the World** — Evaluate societal, environmental, and global impacts on sustainability.
- **PO7: Ethics** — Commit to professional ethics, human values, and legal compliance.
- **PO8: Individual and Collaborative Team Work** — Function effectively as a member or leader in diverse teams.
- **PO9: Communication** — Write effective reports and present clearly to the engineering community and society.
- **PO10: Project Management and Finance** — Apply engineering management and economic principles to multidisciplinary projects
- **PO11: Life-Long Learning** — Recognize and adapt to technological changes through independent learning

Program Educational Objectives (PEOs)

PEO 1. Technical Skills : Graduates will excel in their professional careers and higher studies by applying the knowledge acquired in computer science and cybersecurity, with a commitment to lifelong learning.

PEO 2. Security Experts: Design and implement cybersecurity-based solutions to address industrial and societal challenges, ensuring secure and reliable computing systems.

PEO 3. Social Awareness and Ethics: Exhibit effective communication skills, leadership qualities, and uphold professional and ethical values in cybersecurity practices and related

Program Specific Outcomes (PSOs)

PSO 1. Identify and apply appropriate cybersecurity tools, techniques, and technologies to develop secure systems and solutions in networking, computing, and information security.

PSO 2. Design and develop cybersecurity-enabled solutions and services to address industrial requirements and broader societal needs, ensuring data protection, privacy, and system resilience.

**B.E-Department of Computer Science And Engineering
(CYBER SECURITY)
REGULATIONS 2026**

For the students admitted from 2026 onwards

**CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR I - VIII SEMESTERS**

SEMESTER I

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1	U26EN121	English Proficiency - I	L	HSMC	0	0	2	0	1
2	U26MA101	Matrices And Calculus	T	BSC	3	1	0	0	4
3	U26PH111	Physics for Computer Systems	TWL	BSC	2	0	2	0	3
4	U26CS111	Problem Solving and C Programming	TWL	ESC	2	0	2	0	3
5	U26CB101	Cyber Security Essentials	T	ESC	3	0	0	0	3
6	U26CS102	Digital Technologies - I	T	ESC	1	0	0	0	1
7	U26CS121	Computer Hardware Essentials	L	PCC	0	0	4	0	2
8	U26ME121	Engineering Practices Laboratory	L	ESC	0	0	4	0	2
9	U26CEC01	Design Thinking	TWL	PCC	1	0	2	0	2
Total					12	1	16	0	21
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U26MC101	Induction Program – Universal human Values I	T	MCC	3	0	0	0	3
10	U26TA101	தமிழர்மரபு / Heritage of Tamils	T	MCC	1	0	0	0	1

SEMESTER II

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1	U26EN221	English Proficiency II	L	HSMC	0	0	2	0	1
2	U26MA201	Discrete Mathematics	T	BSC	3	1	0	0	4
3	U26CY211	Chemistry for Computer systems	TwL	BSC	2	0	2	0	3
4	U26CS211	Digital principles and computer organization	T	BSC	3	0	0	0	3
5	U26CB201	Classical Cryptography	T	PCC	3	0	0	0	3
6	U26CS212	Problem Solving using Python Programing	TwL	BSC	2	0	2	0	3
7	U26EE201	Electronic Devices and Circuits	TwL	BSC	2	0	2	0	3

8	U26CS201	Digital Technologies - II	T	PCC	1	0	0	0	1
Total					16	1	8	0	21
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
9	U26MC201	Universal Human Values II	T	MCC	3	0	0	0	3
10	U26TA201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	T	MCC	1	0	0	0	1

SEMESTER III

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE*	CATEGORY	L	T	P	J	C
1		English Proficiency III	L	HSMC	0	0	2	0	1
2		Probability And Statistics	T	BSC	3	1	0	0	4
3		Object Oriented Programming	L	PCC	3	0	0	0	3
4		Operating Systems	TwL	PCC	3	0	2	0	4
5		Database Management System	T	PCC	3	0	0	0	3
6		Modern Cryptography	T	PCC	2	0	0	0	2
7		Digital Technologies - II	T	PCC	1	0	0	0	1
8		OOP Lab	L	PCC	0	0	4	0	2
9		Database Management Lab	L	PCC	0	0	4	0	2
10		Cyber Security Problem Solving & Mini-Project	L	PCC	0	0	0	2	2
Total					15	1	12	2	24
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
10		Constitution of India	T	MNC	2	0	0	0	1
11		Heritage of Tamil - தமிழ்*	T	MCC	1	0	0	0	1

SEMESTER IV

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		English Proficiency - IV	L	HSMC	0	0	2	0	1
2		Design and Analysis of Algorithms	T	PCC	3	0	0	0	3
3		Computer Networks	T	PCC	3	0	0	0	3

4		Machine Learning Techniques	T	PCC	3	0	0	0	3
5		Open Elective - I	T	OEC	3	0	0	0	3
6		Computer Networks Lab	L	PCC	0	0	4	0	2
7		Machine Learning Lab	L	PCC	0	0	4	0	2
8		System Security Management	TWL	PCC	3	0	2	0	4
9		Software Design & Rapid Prototyping – I	L	PCC	0	0	2	0	1
10		Professional Skill Training - I	L	EEC	0	0	4	0	2
Total					15	0	18	0	24
MANDATORY CREDIT COURSES (MCC - Non CGPA) / MANDATORY NON-CREDIT COURSES (MNC)									
11		Essentials of Indian Traditional Knowledge	T	MCC	2	0	0	0	1

SEMESTER V

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Optimization Techniques	T	PCC	3	0	0	0	3
2		Artificial Intelligence	T	PCC	4	0	0	0	4
3		Ethical Hacking and Social Engineering	T	PCC	3	0	0	0	3
		Principles of Management	T	HSS	3	0	0	0	3
4		Data Mining and Warehousing	T	PCC	3	0	0	0	3
5		Professional Elective – I	T	OEC	3	0	0	0	3
6		Open Elective – II	T	ESC	2	0	0	0	3
7		Software Design & Rapid Prototyping – II	L	ESC	0	0	4	0	2
8		Professional Skill Training - II	L	PCC	0	0	2	0	1
Total					21	0	6	0	25

SEMESTER VI

Sl. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Network Security	TwL	PCC	3	0	2	0	4
2		GenAI Advanced Prompt Engineering	TwL	PCC	3	0	2	0	4

3		Cloud Computing and Security	TwL	PCC	3	0	2	0	4
4		Cyber Forensics	T	PEC	3	0	0	0	3
5		Reinforcement Learning	T	PEC	3	0	0	0	3
6		Software Engineering	T	PCC	3	0	0	0	3
7		Professional Elective – II	T	EEC	3	0	0	0	3
Total					21	0	6	0	24

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	COURSE TYPE	CATEGORY	L	T	P	J	C
1		Cyber Attack Simulation and Security Testing	T	PCC	3	0	0	0	3
2		Cyber Security	TwL	PCC	2	0	2	0	3
3		Professional Elective – V	T	PEC	3	0	0	0	3
4		Professional Elective – VI	T	PEC	3	0	0	0	3
5		Open Elective –IV	T	OEC	3	0	0	0	3
6		Project work Phase – I	P	EEC	0	0	4	0	2
Total					14	0	6	0	17

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	J	C
1		Internship / Industrial Training*	EEC	0	0	0	4	2
2		Project work Phase – II	EEC	0	0	0	20	10
Total				0	0	0	24	12

*4- Weeks duration any Semester vacation from II to VI Semester

TOTAL CREDITS: 165

SEMESTER I

SYLLABUS:

UNIT I READING AND INTERPRETATION

9

Vocabulary in Context – Discourse Markers – Reading Techniques – Oral, Reading: Rhythm and Intonation – Analytical Interpretation - Comprehension and Story Analysis – Evaluative Reading of Summaries and Findings from Journals / Articles / Online Content.

UNIT II PRINT MEDIA AND LITERATURE

9

Print Media Study: Editorials, Views and Feature Articles – Short Story: “*The Last Leaf*” – O. Henry – Science Fiction: “*The Time Machine*” – H.G. Wells.

UNIT III CASE STUDIES AND INSPIRING INNOVATORS

9

Reading Technical Documents (Guidelines & Manuals) – Case Study Review (Field- Based Learning) - A Case Analysis – Life Stories of Renowned Scientists and Innovators – Inspiring Journeys of Entrepreneurs and Emerging Ventures.

Contact Periods:

Lecture: - Periods

Tutorial: - Periods

Practical: 30 Periods

Total: 30 Periods

TEXT BOOKS:

1. O. Henry. *The Complete Short Stories of O. Henry*. Dover Publications, 1996. Comprehensive collection of O. Henry’s stories, including *The Last Leaf*.
2. H. G. Wells. *The Time Machine*. Penguin Classics, 2005. Standard academic edition with notes and analysis for study

REFERENCES:

- Wells, H. G. *The Time Machine*. Penguin Classics, 2012. [https://openlibrary.org/books/OL26970973M/The_Time_Machine_%28Penguin Classics%29](https://openlibrary.org/books/OL26970973M/The_Time_Machine_%28Penguin_Classics%29)
- McWhorter, Kathleen, and Brette M. Sember. *College Reading and Study Skills*. 14th ed., Pearson, 2021. <https://www.pearson.com/en-us/pearsonplus/p/9780137530809>

EVALUATION PATTERN:

Continuous Internal Assessments		End Semester Examinations (practical)	
Practical		Test/Report Evaluation	Presentation & Viva
Evaluation of students work, Observation, Record, etc.	Lab test (model practical)		
45 (100)	15 (100)	30 (80)	10 (20)
60		40	
Total		100	

U26ME101	MATRICES AND CALCULUS (Common for all Programmes))	Category: HSMC				
		L	T	P	J	C
		3	1	0	0	4

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications
- To familiarize the students with differential calculus
- Analyze vector fields using gradient, divergence, and curl; verify and apply Green's, Gauss divergence in practical problems
- To make the students understand various techniques of integration
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

COURSE OUTCOMES:

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Use the matrix algebra methods for solving practical problems	Apply
CO2	Apply differential calculus tools in solving various application problems.	Apply
CO3	Compute the total derivatives and extreme values of multivariable functions	Apply
CO4	Compute double and triple integrals in Cartesian coordinates to determine geometric areas and volumes.	Apply
CO5	Analyze vector fields using gradient, divergence, and curl; verify and apply Green's, Gauss divergence in engineering problems	Apply

CO PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	1	1	1	-	-	-	-	-	-	2	1
CO2	3	3	1	2	1	-	-	-	-	-	-	2	1
CO3	3	3	1	2	1	-	-	-	-	-	-	2	1
CO4	3	3	2	2	1	-	-	-	-	-	-	2	1
CO5	3	3	2	3	2	-	-	-	-	-	-	3	2

Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)

UNIT -I MATRICES 9

UNIT-II DIFFERENTIAL CALCULUS 9

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9

UNIT IV MULTIPLE INTEGRALS 9

UNIT V VECTOR CALCULUS 9

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: - Periods **Total: 60 Periods**

1. George B. Thomas Jr., Maurice D. Weir and Joel R. Hass, Thomas' Calculus: Early Transcendentals, 13th Edition, Pearson Education, 2014
2. P. Kandasamy, K. Thilagavathi and K. Gunavathi, Engineering Mathematics, Reprint Edition, S.Chand and Co., New Delhi, 2026

1. Engineering Mathematics – S. Narayanan, T. K. Manicavachagom Pillay & G. Ramanaiah, (Latest Reprint), S. Viswanathan Publishers.
2. Engineering Mathematics – B. K. Pal & K. Das, (Latest Edition), Oxford University Press India.
3. Advanced Engineering Mathematics, Erwin Kreyszig, 10th Edition (2018), Wiley India
4. Grewal B.S., “Higher Engineering Mathematics” 45th Edition, Khanna Publishers, New Delhi, 2024

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26CS111	Problem Solving and C Programming (Common for all branches)	CATEGORY : ESC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

To provide exposure to problem-solving through programming

To develop computational thinking perspective of one's own discipline

To write, compile and debug programs using C language

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Formulate the algorithmic solutions for a given computational problem	(Apply)
CO2	Describe modularization, structures and pointers in C language	(Apply)
CO3	Design and implement algorithms for a given problem using C control structures	(Apply)
CO4	Apply the C programming constructs for searching and sorting techniques	(Apply)
CO5	Solve real time problems using suitable non-primitive data structures in C	(Apply)

CO-PO MAPPING

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

Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SYLLABUS:

6

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Files - Types of file processing - Sequential access - Random access - Sequential access file - Example Program - Finding average of numbers stored in sequential access file - Random access file - Example Program - Transaction processing using random access files - Command line arguments.

LIST OF EXPERIMENTS / EXERCISES:

- 1 Using IO Statements, get higher secondary marks of a student. Calculate and display the medical and engineering cut-off marks. [Assume the calculation formula]
- 2 Develop a C program to emulate the operations of an ATM using control structures. Authentication, Deposit, Withdrawal, and Balance check and pin change operations are to be supported
- 3 Develop a calculator to perform the operations including addition, subtraction, multiplication, division and square of a number.
- 4 Given different prices of a vegetable which is varying through the day (from morning to evening), find out the best buy price and sell price for the maximum profit. Eg. For the prices [33, 35, 28, 36, 39, 25, 22, 31], best buy is at 28 and best sell is at 39.
- 5 Collect height and weight of 4 of your friends and calculate their body mass index. Use 2 dimensional arrays to store the values.
- 6 Weights of 10 students of your class who are standing in a line is given in a random order. Find out if there is a heavy person whose weight is the sum of previous Mo persons.
- 7 Solve Towers of Hanoi using recursion
- 8 Develop an expense manager which reads date, product, price and product category. The program should display the total expense amount based on product category or date as per user's selection. Use structures

Contact Periods:

Lecture: 45 Periods

Tutorial: - Periods

Practical: 15 Periods

Total: 60 Periods

TEXT BOOKS:

- 1 David D. Railey and Kenny A.Hunt , “Computational Thinking for Modern problem Solver!”, 4st Edition, CRC Press, 2021.
- 2 Brian W. Kernighan and Dennis Ritchie, “The C Programming Language” 5rd Edition, Pearson, 2020.

REFERENCE BOOKS

- 1 Paolo Ferragina and FabrizioLuccio, “Computational Thinking First Algorithms”, Then Code”, 1st Edition, Springer International Publishing, 2018.
- 2 ReemaThareja, “Programming in C”, 2nd Edition, Oxford University Press, 2016.
- 3 Paul Deitel and Harvey Deitel, "C How to Program”, 7th Edition, Pearson Publication
- 4 Juneja, B. L and Anita Seth, “Programming in C”, 1st Edition, Cengage Learning India

EVALUATION PATTERN

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc.	Lab Test	
35%			15%		50%
15 (60)	15 (60)	5 (40)	10 (75)	5(25)	50 (100)

U26CB101	CYBER SECURITY ESSENTIALS	CATEGORY : ESC				
		L	T	P	J	C
		3	1	0	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understand fundamental concepts of discrete structures such as sets, relations, and functions.
- Develop logical reasoning and problem-solving skills using propositional and predicate logic.
- Apply combinatorial techniques and counting principles in real-world problem

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Analyze the properties of matter, elasticity, and bending phenomena in engineering materials.	Understand
CO2	Explain the principles of heat transfer, thermal conductivity, and thermal insulation in practical applications.	Apply
CO3	Understand the concepts of optics, interferometry, lasers, and their industrial applications..	Understand
CO4	Explain the basic principles of quantum mechanics, including black body radiation, photoelectric effect, and quantum tunnelling.	Understand
CO5	Understand the fundamentals of nano devices, carbon nanotubes, and quantum computing systems.	Remember

CO-PO MAPPING

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	2	-	1	2	2	2	-	3	-
CO2	2	2	1	1	-	3	-	1	2	2	2	1	2	1
CO3	2	3	2	2	1	2	-	1	2	2	2	-	3	-
CO4	2	2	1	2	-	2	-	1	2	2	2	2	2	2
CO5	2	2	2	1	2	3	-	1	2	2	2	2	2	2
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)														

Correlation Levels: 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)

SYLLABUS:

UNIT -I INTRODUCTION TO CYBER SECURITY 9

Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks

UNIT-II CYBERSPACE AND THE LAW & CYBER FORENSICS 9

Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, the Need for Computer Forensics

UNIT III CYBERCRIME 9

Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices

UNIT IV CYBER SECURITY 9

Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

UNIT V PRIVACY ISSUES 9

Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains medical, financial, etc

Contact Periods:

Lecture: 45 Periods	Tutorial: - Periods	Practical: Periods	Total: 45 Periods
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TEXT BOOKS:

- 1 Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wile
- 2 2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018

REFERENCE BOOKS

- 1 Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
- 2 Introduction to Cyber Security, Chwan-Hwa(john) Wu, J. David Irwin, CRC Press T&F Group

EVALUATION PATTERN

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

SYLLABUS

UNIT -I PHOTONICS

6

Reflection and refraction of light waves – Theory of lasers: characteristics, spontaneous and stimulated emission – Einstein's coefficients, population inversion – Types of lasers: Nd-YAG laser- CO2 laser - semiconductor laser – Industrial applications of lasers.

UNIT-II FIBRE OPTICS AND APPLICATIONS

6

Optical fiber: propagation of light based on total internal reflection. Numerical aperture and acceptance angle. Classification of optical fibers based on refractive index, modes and materials. Fiber optic communication system. Fiber optic sensors: temperature and displacement sensors.

UNIT III SEMICONDUCTORS

6

Properties of semiconductors. Direct and indirect band gap semiconductors. Intrinsic and extrinsic semiconductors. Carrier concentration in n-type and p-type semiconductors. Carrier transport in semiconductors. Hall effect. Ohmic contacts and Schottky diodes.

UNIT IV MAGNETIC MATERIALS

6

Classification of magnetic materials. Ferromagnetism and domain theory. Hysteresis. Soft and hard magnetic materials. Ferrites. GMR sensors. Magnetic bubble memory. Principle of magnetic recording. Magnetic storage devices.

UNIT V QUANTUM PHYSICS

6

Black body radiation, Photoelectric effect, de Broglie hypothesis, Schrödinger wave equation, Particle in a box (infinite potential well – three-dimensional box), Barrier penetration and quantum tunnelling.

LIST OF EXPERIMENTS :

- 1 Laser- Determination of the wave length of the laser using grating.
- 2 Post office box -Determination of Band gap of a semiconductor.
- 3 Determination of velocity of sound and compressibility of liquid– Ultrasonic Interferometer
- 4 Optical fibre -Determination of Numerical Aperture and acceptance angle
- 5 Photoelectric effect.
- 6 Compact disc- Determination of width of the groove using laser.

Contact Periods:

Lecture: 30 Periods Tutorial: - Periods Practical: 30 Periods **Total: 60 Periods**

TEXT BOOKS:

- 1 M.N. Avadhanulu, P.G. Kshirsagar, and T.V.S. Arun Murthy, “A Textbook of Engineering Physics”, 11th edition, S. Chand Publishing, New Delhi, 2022.
- 2 TAMILARASAN K and PRABU K, “Physics for Engineering I”, 1st Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2023

REFERENCE BOOKS

- 1 Arthur Beiser Concepts of Modern Physics, “Concepts of Modern Physics”, 7th edition, McGraw Hill, 2020.
- 2 Euth Ortiz Ortega, Hamed Hosseinian, Ingrid Berenice Aguilar Meza, Maria Jose Rosales Lopez, Andrea Rodriguez Vera, Samira Hosseini, “Material Characterization Techniques and Applications”, Springer, 2022.
- 3 NPTEL, “Engineering Physics”, Online Course, IIT, 2019.
- 4 SWAYAM, “Physics & Nanotechnology Courses”, Online Platform, Govt. of India, 2019.

EVALUATION PATTERN

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc.	Lab Test	
35%			15%		50%
15 (60)	15 (60)	5 (40)	10 (75)	5(25)	50 (100)

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES

15

PLUMBING WORK

- a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- b) Preparing plumbing line sketches.
- c) Laying pipe connection to the suction side of a pump
- d) Laying pipe connection to the delivery side of a pump.
- e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances

WOOD WORK

- a) Sawing.
- b) Planing.
- c) Making joints like T-Joint, Mortise joint, Tenon joint and Dovetail joint.

Wood Work Study:

- a) Studying joints in door panels and wooden furniture.
- b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES

15

- a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- b) Staircase wiring
- c) Fluorescent Lamp wiring with introduction to CFL and LED types.
- d) Energy meter wiring and related calculations/ calibration
- e) Study of Iron Box wiring and assembly
- f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
- g) Study of emergency lamp wiring/Water heater

PART III MECHANICAL ENGINEERING PRACTICES

15

WELDING WORK:

Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

- b) Practicing gas welding.

BASIC MACHINING WORK:

- a) simple Turning.
- b) simple Drilling.
- c) simple Tapping

ASSEMBLY WORK:

- a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an airconditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONICS ENGINEERING PRACTICES

15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

Contact Periods:

Lecture: 0

Tutorial: 0

Practical: 60 Periods

Total: 60 Periods

EVALUATION PATTERN:

Continuous Internal Assessments		End Semester Examinations (practical)	
Practical		Test/Report Evaluation	Presentation & Viva
Evaluation of students work, Observation, Record, etc.	Lab test (model practical)		
45 (100)	15 (100)	30 (80)	10 (20)
60		40	
Total		100	

LIST OF EXPERIMENTS / EXERCISES:

- 1 Identification and Study of Basic PC Hardware Components
- 2 Hard Disk Partitioning and Disk Defragmentation
- 3 BIOS Setup and Boot Configuration
- 4 Creating a Bootable USB and Installing Windows OS
- 5 Installing Ubuntu OS and Configuring Dual Boot System
- 6 Assembling and Upgrading a PC System
- 7 Installing and Configuring Printers and Scanners
- 8 Setting Up External Devices and Peripherals
- 9 BIOS Update and Troubleshooting BIOS Issues
- 10 Diagnostic and Troubleshooting of PC Hardware Systems

Contact Periods:**Lecture: -****Tutorial: -****Practical: 30 Periods****Total: 30 Periods****EVALUATION PATTERN:**

Continuous Internal Assessments		End Semester Examinations (practical)	
Practical		Test/Report Evaluation	Presentation & Viva
Evaluation of students work, Observation, Record, etc.	Lab test (model practical)		
45 (100)	15 (100)	30 (80)	10 (20)
60		40	
Total		100	

SYLLABUS:

UNIT -I MODERN ARTIFICIAL INTELLIGENCE AND OPENAI TOOLS 6

An Overview of Artificial Intelligence - Introduction to Machine Learning and Deep Learning - ChatGPT- GPT 4 - OpenAI Tools: AI Text Classifier - OpenAI Tools: Point-E - Text to Image Generator - DALL-

UNIT-II MART SYSTEMS AND ANALYTICS 6

Intelligent Wearables - AI and Metaverse - Edge AI / TinyML - Evolution of Big Data Analytics -Applications of Big Data Analyticse

UNIT III MART SYSTEMS AND ANALYTICS 6

Internet of Things - Applications of IoT - Industrial Internet of Things or IIoT - Digital Payments -Overview of Cloud Computing - Applications of Cloud Computing - Service Models in Cloud Computing - Overview of Cybersecurity - Applications of Cybersecurity - Types of Cyber Attacks - Data Privacy and User Data Control - Deepfake

UNIT IV DIGITAL INNOVATION AND AUTOMATION 6

Evolution of Blockchain - Applications of Blockchain in Finance Industry - Impact of Blockchain on Workforce & Workplace - Getting Started with Robotic Process Automation - Applications of Robotic Process Automation in Banking & Insurance Industry - Web, Mobile Development and Marketing - 5Ds of Digital Marketing - Digital Storytelling

UNIT V DIGITAL DESIGN AND RESPONSIBILITY 6

F3D Printing Modelling - Digital Manufacturing - Augmented Reality and Virtual Reality - Pre-requisites for Augmented Reality & Virtual Reality - Metaverse - Applications of Augmented Reality - Virtual Reality in - AI Ethics - Ethical Considerations of Generative AI

Total:30 Periods

TEXT BOOKS:

- 1 Faheem Syeed Masoodi, Zubair Sayeed Masoodi, Khalid Bashir Dar, "Digital and Technological Solutions: Exploring the Foundations of Digitization", 1st Edition, BPB Publications, 2024

REFERENCE BOOKS

- 1 Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2020
- 2 Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach" Universities Press, 2014

EVALUATION PATTERN:

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

U26MC101	Induction Program - Universal Human Values (Common to all programmes)	Category				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understanding (or developing clarity) of the harmony in the human being, family, society, and nature/existence
Strengthening of self-reflection
- Development of commitment and courage to act

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Recognize the essentials of human values and skills	Understand
CO2	Analyse connection between profession and happiness Understand	Understand
CO3	Develop appropriate technologies and management patterns to create harmony in family and society	Understand
CO4	Develop appropriate technologies and management patterns to create harmony in family and society	Understand
CO5	Demonstrate professional and ethical responsibility	Understand

CO-PO MAPPING

[illegible]

Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)

SYLLABUS:

UNIT -I INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT, AND PROCESS 9 **FOR VALUE EDUCATION**

Purpose and motivation for the course - 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 the fulfillment of aspirations of every human being with their correct priority - Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT-II HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF 9

Understanding human beings as a co-existence of the sentient 'I' and the material 'Body' - Understanding the needs of Self ('I') and 'Body' - Happiness and Convenience - Understanding the Body as an instrument of 'I' (I being the doer, seer, and enjoyer) - Understanding the harmony of I with the Body: Self-control and Welfare; correct appraisal of Physical needs - Meaning of Prosperity in detail - Programs to ensure Self-control and Welfare

UNIT III HARMONY IN THE FAMILY AND SOCIETY S 9

Understanding values in human - Human relationships; the meaning of Justice (nine universal values in relationships) and the program for its fulfillment to ensure satisfaction - Trust and Respect as the foundational values of relationship - Understanding the meaning of Trust - Difference between intention and competence - Understanding the meaning of Respect - The Difference between respect and differentiation; and the other salient values in relationship - Understanding the harmony in the society (society being an extension of the family): Peace, Prosperity, Courage, and Coexistence as comprehensive Human Goals - Visualizing a universal harmonious order in society - Undivided Society - Universal Order from family to world family

UNIT IV HARMONY IN THE NATURE AND EXISTENCE 9

Understanding the harmony in Nature, Interconnectedness, and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature - Understanding Existence as a Co-existence of mutually interacting units in an allpervasive space - Holistic perception of harmony at all levels of existence - Practice sessions to discuss human beings as the cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc

UNIT V HARMONY ON PROFESSIONAL ETHICS 9

Natural acceptance of human values - Definitiveness of Ethical Human Conduct - Basic for Humanistic Education Humanistic Constitution, and Humanistic Universal Order Competence in professional ethics - Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people, friendly and eco-friendly production systems, and Ability to identify and develop appropriate technologies and management patterns for the above production systems

Total:45 Periods

TEXT BOOKS:

- 1 RR Gaur, R. Asthana, GP Bagaria, A Foundation course in Human Values and Professional Ethics, 3rd Edition, Books, New Delhi, 2024

REFERENCE BOOKS

- 1 Ivan Illich, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA, 197

EVALUATION PATTERN:

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

U26TA101	தமிழர்மரபு / Heritage of Tamils (Common to all programmes)	CATEGORY :MCC				
		L	T	P	J	C
		1	0	0	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- Learn the extensive literature of classical Tamil
- Review the fine arts heritage of Tamil culture
- Realize the contribution of Tamils in Indian freedom struggle

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Understand the extensive literature of Tamil and its classical nature	Understand
CO2	Understand the heritage of sculpture, painting and musical instruments of ancient people	Understand
CO3	Review on folk and martial arts of Tamil people	Understand
CO4	Realization of Thinaï concepts, trade and victory of Chozha dynasty	Understand
CO5	Understand the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha	Understand

CO-PO MAPPING:

CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02
1	-	-	-	-	-	-	3	3	-	2	-	-	-
2	-	-	-	-	-	-	3	3	-	2	-	1	-
3	-	-	-	-	-	-	3	3	-	2	-	1	2
4	-	-	-	-	-	-	3	3	-	2	-	1	2
5	-	-	-	-	-	-	3	3	-	2	-	1	2

SYLLABUS:

UNIT -I LANGUAGE AND LITERATURE

3

Language Families in India - Dravidian Languages - Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature - Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT-II HERITAGE - ROCK ART PAINTINGS TO MODERN ART - SCULPTURE

3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS

3

Tattooing, basket weaving, Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils .

UNIT IV THINAI CONCEPT OF TAMILS

3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age -Overseas Conquest of Cholas

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India - SelfRespect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine - Inscriptions & Manuscripts - Print History of Tamil Books.

Total:15 Periods

Contact Periods:

Lecture: 15 Periods

Tutorial: - Periods

Practical: -Periods

Total: 15 Period

TEXT BOOKS:

- 1 Jayanthi Ravikrishna K, Heritage of Tamils, Sri Krishna publications, First Edition, 2023
- 2 S. Priyadarshini, Heritage of Tamils, V. K. Publications.

REFERENCE BOOKS

- 1 History, People and Culture of Tamil Nadu – K.K. Pillai, International Institute of Tamil Studies, C.P.T Campus, Chennai.
- 2 Computer Tamil – Dr. Il. Sundaram, Vikatan Publications, Anna Salai, Chennai, December 2016.

EVALUATION PATTERN:

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

SYLLABUS:

UNIT I DESIGN THINKING

3

Key Principles and Mindset – Five Phases, Methods and Tools of Design Thinking – User Guide – Foundation Building for Design Thinking – Explore: Methods & Tools – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing.

UNIT II EMPATHIZE:

3

Methods & Tools – Field Observation – Deep User Interview – Empathy Map – User Journey Map - Need Finding – User Insights - User Persona Development.

UNIT III EXPERIMENT

3

Methods & Tools – Ideation – SCAMPER – Analogous Inspiration – Deconstruct & Reconstruct – User Experience Journey – Prototyping– Idea Refinement.

UNIT IV ENGAGE

3

Methods & Tools – Story Telling – Art of Story Telling – Storyboarding – Co-Creation with Users – Collect Feedback from Users.

UNIT V EVOLVE

3

Methods & Tools – Concept Synthesis – Strategic Requirements – Evolved Activity Systems – Activity System Integration – Viability Analysis – Innovation Tools using User Needs, CAP, 4S – Change Management - Quick Wins.

LIST OF EXPERIMENTS / PRACTICAL EXERCISES

1. Study and analysis of a real-world problem using STEEP Analysis.
2. Perform Stakeholder Mapping for a selected case study.
3. Develop an Activity System Map for an existing product/service.
4. Conduct Field Observation and document findings.
5. Perform a Deep User Interview and analyze responses.
6. Create an Empathy Map based on collected data.
7. Generate ideas using Brainstorming and SCAMPER techniques.
8. Apply Analogous Inspiration for innovative thinking.
9. Perform Deconstruct & Reconstruct exercise on an existing product.
10. Develop a Storytelling script for a design solution.
11. Create a Storyboard representing the user experience.
12. Conduct Co-creation sessions with users.
13. Perform Concept Synthesis for final solution design.
14. Define Strategic Requirements for implementation.
15. Develop an Evolved Activity System.

Contact Periods:

Lecture: 15 Periods

Tutorial: -

Practical: 30 Periods

Total: 45 Periods**EVALUATION PATTERN:**

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

SEMESTER II

U26CY211	CHEMISTRY FOR COMPUTER SYSTEMS (Applicable only for AI&DS, CSE,CSE (CS) and IT)	Category: BSC				
		L	T	P	J	C
		2	0	2	0	3

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To introduce materials chemistry relevant to computer hardware and electronics.
- To impart knowledge on electrochemical energy systems used in modern devices
- To understand nanomaterials, semiconductors and their applications in the engineering field.
- To create awareness about e-waste, its environmental impact and management practices.
- To familiarize insulating materials and their applications in electrical and electronic systems

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Explain the types and properties of materials used in computer hardware components.	(Apply)
CO2	Analyze the working of batteries, fuel cells and energy storage devices.	(Analyze)
CO3	Illustrate the basic concepts of semiconductors and nanomaterial's and their applications.	(Apply)
CO4	Analyze e-waste management techniques and their environmental impact.	(Analyze)
CO5	Apply knowledge of insulating materials in electrical and electronic applications.	(Apply)

CO PO MAPPING

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

Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)

SYLLABUS

UNIT -I MATERIALS FOR HARDWARE 6

Types of materials – metals, plastics, ceramics – Conductors and insulators – Simple idea of semiconductors – Materials used in wires, chips and circuit boards – Thermal management materials in CPUs.

UNIT-II ELECTROCHEMISTRY AND ENERGY STORAGE DEVICES 6

Batteries – Types: dry cell, lithium-ion battery – Working principal of mobile and laptop batteries Charging and safety – Introduction to supercapacitors – Fuel cells – Energy storage in portable electronics and computers.

UNIT III SEMICONDUCTORS AND NANOMATERIALS 6

Intrinsic and extrinsic semiconductors – p-n junction – Introduction to semiconductor devices (diodes, transistors – concept only) – Types (0D, 1D, 2D) – Synthesis methods (top-down, bottom-up) – Properties and applications

UNIT IV E-WASTE AND ITS MANAGEMENT 6

Introduction, sources of e-waste, hazardous substances and their effects on environment and human health; e-waste handling rules, management, recycling and disposal treatment methods. Mechanism of extraction of precious metals from leaching solution; global and Indian e-waste scenario with case studies.

UNIT V INSULATING MATERIALS 6

Introduction - requirements - classification (Solid, Liquid & Gas) - solid inorganic insulators (glass, ceramics), organic insulator (epoxy resin), liquid insulator (transformer oil), and gas insulator (SF₆).- Electrical resistivity and factors affecting it- high-resistivity materials including molybdenum disilicide and nichrome—composition, characteristics, and uses- - molybdenum disilicide and nichrome - polymers an electrical insulators - non-polar polymers - polar polymers - polarization of polymers.

LIST OF EXPERIMENTS :

- 1 Estimation of total hardness of water by EDTA method.
- 2 Determination of rate of corrosion of mild steel by weight loss method.
- 3 Determination of chloride content in water sample by argentometric method.
- 4 Determination of pK_a of a weak acid using glass electrode (pH sensor).
- 5 Determination of strength of HCl acid by using pH meter.
- 6 Estimation of Ferrous iron by potentiometric Titration.
- 7 To find Viscosity of a Transparent Liquid (Virtual lab).
(<https://bop-iitk.vlabs.ac.in/exp/liquid-viscosity/index.html>)

Contact Periods:

Lecture: 30 Periods

Tutorial: - Periods

Practical: 30 Periods

Total: 60 Periods**TEXT BOOKS:**

- 1 Engineering Chemistry, P. C. Jain & Trishla Jain, 2023, 17th Edition, Dhanpat Rai & Co. (P) Ltd., New Delhi.ISBN-13: 978-9352165728
- 2 Engineering Chemistry, **S. S. Dara & S. S. Umare**, 2022 Edition, S. Chand Publications, New Delhi.ISBN-13: 978-9352533241.

REFERENCE BOOKS

- 1 Friedrich Emich, "Engineering Chemistry", 2nd Edition, Scientific International Pvt. Ltd, New Delhi, 2014.
- 2 Prasanta Rath, "*Engineering Chemistry*", 1^a Edition, Cengage Learning India, Pvt. Ltd, Delhi, 2015
- 3 V. Raghavan & J. R. Gopalakrishnan, *Engineering Chemistry*, McGraw-Hill Education.
- 4 Linden & Reddy, Handbook of Batteries, McGraw-Hill Education.
- 5 *Energy storage and conversion devices*, Anurag Gaur, A. L. Sharma, Anil Arya, 1st Edition, 2021,CRC Press, Taylor and Francis Group, ISBN: 9781003141761.
- 6 <https://nptel.ac.in/courses/113/104/113104008>
- 7 https://onlinecourses.nptel.ac.in/noc24_me34/preview%20%20
- 8 <https://www.vlab.co.in/broad-area-chemical-sciences>

EVALUATION PATTERN

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc.	Lab Test	
35%			15%		50%
15 (60)	15 (60)	5 (40)	10 (75)	5(25)	50 (100)

SYLLABUS

UNIT - I LOGIC AND PROOFS

9

Propositional logic – Propositional equivalences – Rules of inference - Predicates and quantifiers – Nested quantifiers

UNIT - II COMBINATORICS

9

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions.

UNIT - III GRAPHS

9

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths-Dijkstra's shortest path algorithm – Warshall's algorithm

UNIT - IV ALGEBRAIC STRUCTURES

9

Algebraic systems – Semi groups and monoids – Groups – Subgroups –Homomorphism's Normal subgroup and cosets– Lagrange's theorem–Definitions and examples of Rings and Fields

UNIT - V LATTICES AND BOOLEAN ALGEBRA

9

Partial ordering – Posets Hasse Diagram– Lattices – Properties of lattices – Sub lattices – Some special lattices – Boolean algebra-Sub Boolean Algebra Definitions.

Contact Periods:

Lecture: 45 Periods

Tutorial: -15 Periods

Practical: -Periods

Total: 60 Period

TEXT BOOKS:

1. T. Veerarajan, Discrete Mathematics, McGraw Hill Education (India) Pvt. Ltd., Reprint 2026
2. Discrete Mathematics and Its Applications, Kenneth H. Rosen ,8th Edition (2019),McGraw-Hill Education

REFERENCES:

1. Discrete Mathematics, S.Chandrasekaran, M.Umaparvathi, Latest edition (2018),PHI Learning
2. Discrete Mathematics with Applications, Susanna S.Epp, 4th Edition (reprint 2018),Cengage learning.
3. Ralph P. Grimaldi, “Discrete and Combinatorial Mathematics”, 5th Edition, Pearson Education, USA, 2019.

EVALUATION PATTERN

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

UNIT I – Generative AI and Intelligent Systems

Focus on practical understanding of modern AI and Generative AI rather than only introducing specific OpenAI products. This makes the syllabus more technology-neutral and future-ready.

UNIT II – Smart Technologies and Data Analytics

Connect **IoT + Edge AI + Big Data + Analytics** so students understand how data moves from smart devices to intelligent decision-making.

UNIT III – Connected Technologies and Digital Security

Combine IoT, Cloud, Digital Payments and Cybersecurity into a connected digital ecosystem. Include **deepfakes and digital identity** as contemporary digital-security topics.

UNIT IV – Digital Innovation and Automation

Cover **Blockchain + RPA + Digital Marketing + Digital Storytelling**, with emphasis on real-world business applications.

UNIT V – Digital Design, Immersive Technologies and AI Responsibility

Combine **3D Printing + AR/VR/MR + Metaverse + AI Ethics**, giving the final unit a strong focus on responsible use of emerging technologies.

TEXT BOOKS:

- 1 Faheem Syeed Masoodi, Zubair Sayeed Masoodi, Khalid Bashir Dar, "Digital and Technological Solutions: Exploring the Foundations of Digitization", 1st Edition, BPB Publications, 2024

REFERENCE BOOKS

- 1 Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2020
- 2 Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach" Universities Press, 2014

EVALUATION PATTERN:

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

U26CS211	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	CATEGORY:BSC				
		L	T	P	J	C
		3	0	0	0	3

PRE-REQUISITES:

Nil

COURSE OBJECTIVES:

- To understand the fundamentals of digital logic, Boolean algebra, and the design of combinational and sequential circuits.
- To gain knowledge of computer organization, including instruction execution, arithmetic operations, and processor architecture.
- To analyze memory systems, pipelining, and input/output organization in modern computer systems.

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
	convert numbers between different number systems and simplify Boolean expressions using Boolean algebra and K-Map to realize logic functions using logic gates.	K3
	analyze and design combinational and sequential circuits such as adders, subtractors, multiplexers, demultiplexers, decoders, flip-flops, registers and counters.	K4
	describe the functional units of a computer system and perform arithmetic operations including addition, subtraction, multiplication and division algorithms.	K3
	describe processor organization, control unit design, pipelining hazards and memory management techniques including cache and virtual memory.	K4
	describe I/O organization, interrupt handling, DMA, bus arbitration and interconnection techniques used for interfacing peripheral devices.	K2

CO PO MAPPING:

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

Grading Levels: 1. Slight (low) 2. Moderate (Medium) 3. Substantial (High)

SYLLABUS:

UNIT-I L LOGIC FOUNDATIONS

9

Number Systems – Binary, Octal, Hexadecimal –Signed Binary Numbers– Binary Codes–Boolean Algebra: Basic Laws and Theorems – Logic Gates – Universal Gates (NAND, NOR) – Realization of Boolean Functions using Logic Gates.

UNIT-II L CIRCUIT DESIGN

9

Canonical and Standard Forms–K-Map Simplification–Don't Care Conditions–Combinational Circuits: Adders, Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders –Sequential Circuits: Flip-Flops, Registers, Counters – Shift Registers.

UNIT III COMPUTER SYSTEM ORGANIZATION

9

Functional Units of Computer – Instruction Cycle – Data Representation – Memory Locations and Addresses – RISC vs CISC – Arithmetic Operations: Addition and Subtraction – Fast Adders – Multiplication (Signed & Unsigned) – Division Algorithms – Floating Point Representation.

UNIT IV PROCESSING AND MEMORY ARCHITECTURE

9

Processor Organization–Instruction Execution–Control Unit (Hardwired Control)–Pipelining: Concepts, Stages, Hazards – Memory System: RAM, ROM – Cache Memory – Memory Mapping Techniques – Performance Considerations – Virtual Memory.

UNIT V I/O AND INTERFACING

9

Input / Output Organization–Interrupts–DMA–Bus Structure–Bus Arbitration–Inter connection Standards(USB)–Handling Multiple Devices–Data Transfer Techniques.

LIST OF EXPERIMENTS / EXERCISES:

- 1 Design and Simulation of Fundamental Gates using Universal Gates (NAND and NOR)
- 2 Design and Simulation of Half Adder, Full Adder, Half Subtractor, Full Subtractor
- 3 Design and Simulation of 4-bit Ripple Carry Adder
- 4 Design and Simulation of a 4-bit Arithmetic and Logic unit
- 5 Design and Simulation of D Flip Flop and JK Flip Flop
- 6 Design and Simulation of 8-bit Register
- 7 Design and Simulation of an 8bit SISO, SIPO, PISO, PIPO Shift Registers
Simulation of Data Read and Data Write from a RAM
- 8 Simulation of Control Unit Functionality

Contact Periods:

Lecture: 45 Periods Tutorial: -Periods Practical: -Periods Total: 45 Periods

TEXT BOOKS:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, RISC-V Edition, 2nd Edition, Morgan Kaufmann, 2020.
2. Sarah Harris and David Harris, Digital Design and Computer Architecture: RISC-V Edition, 1st Edition, Morgan Kaufmann, 2021.

REFERENCE BOOKS:

1. J. Clark Scott, But How Do It Know? – The Basic Principles of Computers for Everyone, 2nd Edition, No Starch Press, 2020.
2. BehroozParhami, Computer Architecture: From Microprocessors to Supercomputers, Oxford University Press, 2020.
3. Sarah Harris and David Harris, Digital Design and Computer Architecture: RISC-V Edition, Morgan Kaufmann, 2021.
4. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, RISC-V Edition, 2nd Edition, Morgan Kaufmann, 2020.

EVALUATION PATTERN

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc.	Lab Test	
35%			15%		
15 (60)	15 (60)	5 (40)	10 (75)	5(25)	50 (100)

U26EN221	ENGLISH PROFICIENCY – I (common to all programmes)	Category: HSMC				
		L	T	P	J	C
		0	0	2	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

- To build basic English communication skills through practical language activities.
- To improve pronunciation, vocabulary, and grammar for effective communication.

COURSE OUTCOMES:

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Demonstrate the ability to understand and use basic English in everyday communication.	Understand
CO2	Apply appropriate grammar, vocabulary, and pronunciation in simple spoken and written contexts.	Apply
CO3	Interpret technical documents and case studies and communicate key insights gained from the life stories of scientists, innovators and entrepreneurs	Analyse

CO PO MAPPING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	2	-	-	-	-	-	2	2	-	-	1	1
CO2	-	1	-	-	2	-	-	1	3	-	-	2	-
CO3	1	3	-	3	-	-	-	2	3	-	1	-	2
Correlation Levels; 1.Slight (low) 2. Moderate (Medium) 3. Substantial (High)													

SYLLABUS:

UNIT I READING AND INTERPRETATION

9

Vocabulary in Context – Discourse Markers – Reading Techniques – Oral, Reading: Rhythm and Intonation – Analytical Interpretation - Comprehension and Story Analysis – Evaluative Reading of Summaries and Findings from Journals / Articles / Online Content.

UNIT II PRINT MEDIA AND LITERATURE

9

Print Media Study: Editorials, Views and Feature Articles – Short Story: “*The Last Leaf*” – O. Henry – Science Fiction: “*The Time Machine*” – H.G. Wells.

UNIT III CASE STUDIES AND INSPIRING INNOVATORS

9

Reading Technical Documents (Guidelines & Manuals) – Case Study Review (Field- Based Learning) - A Case Analysis – Life Stories of Renowned Scientists and Innovators – Inspiring Journeys of Entrepreneurs and Emerging Ventures.

Contact Periods:

Lecture: - Periods

Tutorial: - Periods

Practical: 30 Periods

Total: 30 Periods**TEXT BOOKS:**

3. O. Henry. *The Complete Short Stories of O. Henry*. Dover Publications, 1996. Comprehensive collection of O. Henry's stories, including *The Last Leaf*.
4. H. G. Wells. *The Time Machine*. Penguin Classics, 2005. Standard academic edition with notes and analysis for study

REFERENCES:

- Wells, H. G. *The Time Machine*. Penguin Classics, 2012. [https://openlibrary.org/books/OL26970973M/The_Time_Machine_%28Penguin Classics%29](https://openlibrary.org/books/OL26970973M/The_Time_Machine_%28Penguin_Classics%29)
- McWhorter, Kathleen, and Brette M. Sember. *College Reading and StudySkills*. 14th ed., Pearson, 2021. <https://www.pearson.com/en-us/pearsonplus/p/9780137530809>

EVALUATION PATTERN:

Continuous Internal Assessments		End Semester Examinations (practical)	
Practical		Test/Report Evaluation	Presentation & Viva
Evaluation of students work, Observation, Record, etc.	Lab test (model practical)		
45 (100)	15 (100)	30 (80)	10 (20)
60		40	
Total		100	

U26AI201	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	CATEGORY : PCC				
		L	T	P	J	C
		3	0	0	0	3

COURSE OBJECTIVES:

- To introduce the fundamentals of artificial intelligence and intelligent agents
- To learn the methods of knowledge representation and knowledge inference
- To understand the concepts of expert systems

COURSE OUTCOMES: Upon completion of the course, the student will be able to		BT Mapped (Highest Level)
CO1:	Exemplify the fundamentals of Artificial Intelligence and Intelligent agents	Understand
CO2:	Identify appropriate methods to solve AI problems	Understand
CO3:	Use different methodologies to represent and infer knowledge	Understand
CO4:	Apply pre-processing techniques on data	Apply
CO5:	Discuss the concepts of Expert Systems and its models	Understand

SYLLABUS

UNIT I INTELLIGENT AGENTS

9

Introduction to AI – Agents and Environments – Concept of rationality – Nature of environments – Structure of agents Problem solving agents – Search algorithms – Uninformed search strategies.

UNIT II PROBLEM-SOLVING METHODS

9

Heuristic search strategies – Heuristic functions – Local search and optimization problems – Local search in continuous space – Search with non-deterministic actions – Search in partially observable environments – Online search agents and unknown environments.

UNIT III GAME PLAYING AND CSP

9

Game theory – Optimal decisions in games – Alpha-beta search – Monte-carlo tree search – Stochastic games – Partially observable games – Constraint satisfaction problems – Constraint propagation – Backtracking search for CSP – Local search for CSP – Structure of CSP.

UNIT IV LOGICAL AGENTS

9

Knowledge-based agents – Propositional logic – Propositional theorem proving – Propositional model checking – Agents based on propositional logic First-order logic – Syntax and semantics – Knowledge representation and engineering – Inferences in first-order logic – Forward chaining – Backward chaining – Resolution.

UNIT V KNOWLEDGE REPRESENTATION AND PLANNING

9

Ontological engineering – Categories and objects – Events – Mental objects and modal logic – Reasoning systems for categories – Reasoning with default information Classical planning – Algorithms for classical planning – Heuristics for planning – Hierarchical planning – Non-deterministic domains – Time, Schedule, and Resources – Analysis.

Total:45 Periods

TEXT BOOKS:

1. Kevin Knight and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", 3rd edition, McGraw Hill, 2008.
2. Denis Rothman, "Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases", 1st Edition, Packt, 2018.
3. Dan W. Patterson, "Introduction to AI and ES", 1st Edition, Pearson Education, 2007.

REFERENCE BOOKS

- 1 Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
- 2 Stuart Russell and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education, 2007.
- 3 Deepak Khemani "A First Course in Artificial Intelligence", 1st Edition, Tata McGraw Hill Education, 2013.

Continuous Internal Assessments				Total Internal Assessments	End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)			
Individual Assignment / Case Study / Seminar / Mini Project / MCQ)	Written Test	Individual Assignment / Case Study / Seminar / Mini Project / MCQ	Written Test		
60	40	60	40	200	100
Total				60	40
				100	

SYLLABUS:

UNIT I INTRODUCTION – BASIC HUMAN ASPIRATION, ITS FULFILLMENT THROUGH ALL ENCOMPASSING RESOLUTION 9

The basic human aspirations and their fulfillment through Right Understanding and Resolution Right understanding and Resolution as the activities of the Self (self being central to Human Existence) – All encompassing Resolution for a Human Being – Its details and solution of problems in the light of Resolution.

UNIT II RIGHT UNDERSTANDING – KNOWER, KNOWN & THE PROCESS 9

The domain of right understanding starting from understanding the human being and extending up to understanding nature/existence – its interconnectedness and co-existence – and finally understanding the role of human being in existence (human conduct).

UNIT III UNDERSTANDING HUMAN BEING 9

Understanding the human being comprehensively as the first step and the core theme of this course – Human being as co-existence of the self and the body – The activities and potentialities of the self – basis for harmony/contradiction in the self.

UNIT IV UNDERSTANDING NATURE AND EXISTENCE 9

A comprehensive understanding about the existence – Nature being included – The need and process of inner evolution – Particularly awakening to activities of the Self: Realization – Understanding and Contemplation in the Self.

UNIT V UNDERSTANDING HUMAN CONDUCT, ALL-ENCOMPASSING RESOLUTION & HOLISTIC WAY OF LIVING 9

Understanding Human Conduct – Different aspects of all encompassing Resolution – Holistic way of living for Human Being with all encompassing resolution covering all four dimensions of human endeavor viz., realization, thought, behavior and work leading to harmony at all levels from Self to Nature and entire Existence.

Contact Periods:

Lecture: 45 Periods

Tutorial: -

Practical:-

Total: 45 Periods

TEXTBOOKS:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019.

REFERENCES:

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindarajan, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (Including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
3. B P Banerjee, Foundations of Ethics and Management, Excel Books, 2005.
4. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted 2008.

EVALUATION PATTERN

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)

U26TA201	தமிழரும் தொழில்நுட்பமும் Tamils and Technology (For CSE, CSE(CS), IT & AI&DS)	CATEGORY : BSC				
		L	T	P	J	C
		1	0	0	0	1

PRE-REQUISITES:

- Nil

COURSE OBJECTIVES:

To learn weaving, ceramic and construction technology of Tamils

To understand the agriculture, irrigation and manufacturing technology of Tamils

To realize the development of scientific Tamil and Tamilcomputing

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Understand the weaving and ceramic technology of ancient Tamil people nature	Understand
CO2	Understand the construction technology, building materials in Sangam period and case studies	Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving	Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing	Understand

Unit -I WEAVING AND CERAMIC TECHNOLOGY

3

Weaving Industry during Sangam Age - Ceramic technology - Black and Red Ware Potteries (BRW) - Graffiti on Potteries

UNIT-II DESIGN AND CONSTRUCTION TECHNOLOGY

3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age - Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo-Saracenic architecture at Madras during British Period

UNIT III MANUFACTURING TECHNOLOGY

3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel, Copper and gold - Coins as source of history 3 - Minting of Coins - Beads making-industries Stone beads - Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram

UNIT IV GRICULTURE AND IRRIGATION TECHNOLOGY**3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries - Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING**3**

Development of Scientific Tamil - The role of journals in the development of scientific Tamil - Scientific Tamil vocabulary - Tamil computing - Digitalization of Tamil Books - Development of Tamil Software - Tamil Virtual Academy - Tamil Digital Library - Online Tamil Dictionaries - Sorkuvai Project

Total:15 Periods**TEXT BOOKS:**

- 1 Tamils and Technology, K. Jayanthi Ravikrishna, Sri Krishna publications, Mahalakshmi Nagar, Velappanchavadi, Chennai - 600 007, First Edition 2023
- 2 Tamils and Technology, S. Priyadharshini, V. K. Publications, 55, Gopuram Colony, Sivakasi - 626 124

REFERENCE BOOKS

- 1 தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. , International Institute of Tamil Studies, C.P.T Campus, Chennai.
- 2 கணினித் தமிழ் - முனைவர். இல. சுந்தரம்,, அண்ணா சாலை, சென்னை, திசம்பர் 2016

EVALUATION PATTERN:

Continuous Internal Assessments
Assessment (100 Marks)
Total 100

U26CS212	PYTHON PROGRAMMING AND APPLICATIONS (For CSE, CSE(CS), IT & AI&DS)	CATEGORY : BSC				
		L	T	P	J	C
		2	0	2	0	3

COURSE OBJECTIVES:

To understand basic programming concepts using Python

To apply Python for solving Mechatronics problems involving sensors, actuators, and automation

To build logical thinking and problem-solving skills applicable to real-world engineering systems

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Apply basic Python programming constructs using IDEs to develop simple applications	(Understand)
CO2	Apply control structures and user-defined functions to solve computational problems using Python	(Understand)
CO3	Apply Python data structures and file handling techniques to manage and process data effectively	(Apply)
CO4	Apply concepts of object - oriented and modular programming in Python	(Analyze)
CO5	Analyze sensor data and system responses using Python libraries such as NumPy and Matplotlib	(Understand)

CO-PO MAPPING

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

Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

UNIT -I INTRODUCTION TO PYTHON PROGRAMMING & DEVELOPMENT 6

TOOLS

History and features of Python - Python IDEs: Thonny, PyCharm, Jupyter - Data types: Numbers, Strings, Lists, Tuples, Sets, Dictionaries - Variables, Constants, Operators, Expressions - Input and Output functions - Type casting and basic programs

UNIT-II CONTROL STRUCTURES AND FUNCTIONS **6**

Decision Making: if, if-else, elif -Loops: while, for, range) - Loop control: break, continue, pass - Functions: definition, arguments, return values - Scope and recursion

UNIT III PYTHON DATA STRUCTURES AND FILE HANDLING **6**

Lists: operations, slicing, methods - Dictionaries: creation, methods - Sets and Tuples - File handling: opening, reading,

UNIT IV OBJECT-ORIENTED PROGRAMMING AND MODULES **6**

Classes and Objects - Constructor and Destructor- Inheritance and Polymorphism - Creating and importing modules Exception handling

UNIT V INTRODUCTION TO MECHATRONICS APPLICATIONS USING PYTHON **6**

Introduction to interfacing with hardware (simulation or via PySerial) - Basics of numpy and matplotlib for data visualization - Plotting sensor data Simple control system simulation - Basic AI models - Mini project: line follower algorithm logic/ temperature control system

Total:30 Periods

LIST OF EXPERIMENTS / EXERCISES:

- 1 Simple I/O and arithmetic operations
- 2 Displaying sensor names and ranges
- 3 Writing simple math programs for basic mechanical formulas
- 4 Logic-based mechanical system emulati
- 5 Writing control logic for robot movement
- 6 Simulating conditional operations of an automated gate
- 7 File handling for sensor data logs
- 8 Storing sensor data in lists/dictionaries
- 9 Logging data from a virtual sensor to a CSV file
- 10 OOP-based actuator control mock-ups

Total:30 Periods

TEXT BOOKS:

- 1 Reema Thareja, Python Programming: Using Problem Solving Approach, 3rd edition, Oxford University Press, New Delhi, 2023
- 2 John V. Guttag, 2. John V. Guttag, Introduction to Computation and Programming Using Python, 3rd edition, MIT Press, Cambridge, Massachusetts, 2021

REFERENCE BOOKS

- 1 Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Updated for Python 3, 2nd edition, Shroff/O'Reilly Publishers, Mumbai, 2016
- 2 Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", 1st edition, Pearson India Education Services Pvt. Ltd., Bengaluru, 2016

EVALUATION PATTERN

Continuous Assessments					End Semester Examinations
Theory			Practical / Project		Theory
CIAT 1	CIAT 2	Activities	Evaluation of Student's work, Observation, Record, etc.	Lab Test	
35%			15%		50%
15 (60)	15 (60)	5 (40)	10 (75)	5(25)	50 (100)

SYLLABUS:

UNIT I – ELECTRICAL CIRCUITS

9

DC Circuits: Circuit components – conductor, resistor, inductor, capacitor – Ohm's law – Kirchhoff's laws – independent and dependent sources– nodal analysis – mesh analysis with independent sources only. Introduction to AC circuits and parameters: waveforms – average value – RMS value – instantaneous value ,real power,reactive power and apparent power, power factor – steady state analysis of RLC circuits.

UNIT II – ELECTRICAL MACHINES

9

Construction and working principle of DC Generator– EMF equation, types and applications. Working principle of DC motor –Torque Equation,types and applications. Construction, working principle and applications of Transformer, Alternator,Synchronous motor and Three phase Induction motors.

UNIT III – ANALOG ELECTRONICS

9

Semiconductor materials: silicon and germanium – PN junction diode,Zener diode – characteristics and applications – BJT,JFET,SCR,MOSFET,IGBT-types,characteristics and applications.Rectifier and Inverters.

UNIT IV – DIGITAL ELECTRONICS

9

Review of number systems ,binary codes ,error detection and correction codes,combinational logic – representation of logic functions – SOP and POS forms ,K-map representations – minimization using K-maps.

UNIT V – MEASUREMENTS AND INSTRUMENTATION

9

Functional elements of an instrument – operating principle,types – moving coil and moving iron meters – measurement of three phase power, energy meter — DSO- block diagram – data acquisition.

Contact Periods:

Lecture: 45 Periods

Tutorial: -0

Practical: 0

Total: 45 Periods

TEXT BOOKS:

- 1.Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, Second Edition, McGraw Hill Education, 2020
2. S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson Education, Second Edition, 2017.
- 3.A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements & Instrumentation’, Dhanpat Rai and Co, 2015.

REFERENCES:

1. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, Fourth Edition, McGraw Hill Education, 2019.
2. Thomas L. Floyd, ‘Digital Fundamentals’, 11th Edition, Pearson Education, 2017.
- 3.Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition, 2017.

EVALUATION PATTERN:

Continuous Internal Assessments					End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		Total Internal Assessments	
Individual Assignment / Case Study / Seminar / Mini Project / MCQ)	Written Test	Individual Assignment / Case Study / Seminar / Mini Project / MCQ	Written Test		
40	60	40	60		
Total				40	
				100	

	DISCRETE MATHEMATICS (Common for AI&DS , CSE(CS), CSE and IT)	CATEGORY : BSC				
		L	T	P	J	C
		3	1	0	0	4

COURSE OBJECTIVES

- Understand fundamental concepts of discrete structures such as sets, relations, and functions.
- Develop logical reasoning and problem-solving skills using propositional and predicate logic.
- Apply combinatorial techniques and counting principles in real-world problems.
- Analyze graphs and trees for modeling and solving computational problems.
- Algebraic structures and their applications in computer science. Introduce

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Apply logical reasoning to solve computational problems	Apply
CO2	Analyze sets, relations, and functions in discrete systems	Apply
CO3	Solve combinatorial problems using counting techniques	Apply
CO4	Model and analyze problems using graph theory concepts.	Apply
CO5	Understand algebraic structures and their applications.	Apply

Propositional logic – Propositional equivalences – Rules of inference - Predicates and quantifiers – Nested quantifiers .

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions.

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths-Dijkstra's shortest path algorithm – Warshall's algorithm

Algebraic systems – Semi groups and monoids – Groups – Subgroups –Homomorphism's
Normal subgroup and cosets–Lagrange's theorem–Definitions and examples of Rings and Fields

Partial ordering – Posets Hasse Diagram– Lattices – Properties of lattices – Sub lattices – Some special lattices – Boolean algebra-Sub Boolean Algebra Definitions.

TEXT BOOKS:

- ## REFERENCE BOOKS

- 1 Discrete Mathematics, S.Chandrasekaran, M.Umaparvathi, Latest edition (2018),PHI Learning.
- 2 Discrete Mathematics with Applications, Susanna S.Epp, 4th Edition (reprint 2018),Cengage learning.

EVALUATION PATTERN:

Continuous Assessments			End Semester Examinations
CIAT 1	CIAT 2	Activities	
40%			60%
16(60)	16(60)	8(40)	60(100)