LOYOLA ACADEMY

DEGREE & PG COLLEGE
OLD ALWAL, SECUNDERABAD - 500 010, TELANGANA, INDIA
(An Autonomous Institution Affiliated to Osmania University)
Re-accredited with 'A' Grade (III Cycle) by NAAC
A Catholic Christian Minority Institution (Co-Education)
A "College with Potential for Excellence" by UGC
www.loyolaacademy.edu.in**email:**info@loyolaacademy.edu.in **Ph:**040- 27862363/27860077

SYLLABUS

of

B.Sc. Computer Science and Information Technology

For the Academic Year 2025-2026

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B.Sc. Computer Science and Information Technology

Principal **Dean** **Chairman, Board of Studies**

For the Academic Year 2025-2026 for the Batch 2025 – 2026

Sl. No	Content	Page No.
1	Programme Outcomes	I
2	Programme Specific Outcomes	II
3	Consolidated Scheme (Old)	III
4	Consolidated Scheme (New)	IV
5	**FIRST YEAR SEMESTER-I**	1-1
6	General English-I	2-3
7	Value Education and Personality Development	4-5
8	Differential Equations and Elementary Number Theory	6-7
9	Digital Logic Design & Computer Organization	8-10
10	Problem Solving and Programming in C	11-12
11	Computer Networks	13-14
12	Computer Networks Lab	15-15
13	Digital Logic Design -lab	16-16
14	C Programming -Lab	17-17
15	**FIRST YEAR SEMESTER-II**	18-18
16	General English-II	19-20
17	Indian Heritage and Culture	21-22
18	Operating Systems	23-24
19	Matrices and Vector Calculus	25-26
20	Principles of Information Security	27-28
21	Data Structures With C	29-30
22	Operating Systems Lab	31-31
23	Principles of Information Security Lab	32-32
24	Data Structures with C Lab	33-34
25	PLANET*(Outreach)	---
26	**SECOND YEAR SEMESTER-III**	35-35
27	GE Courses Offered by Various Departments 2025-26	36-37
28	Environmental Studies and Gender Sensitization	38-40
29	PC Hardware, and Software Installation	41-42
30	Principles of Information Security	43-44
31	Discrete Mathematics	45-46
32	Computer Networks	47-48
33	Java Programming	49-51
34	PC Hardware and Software Installation – Lab	52-52
35	Principles of Information Security -Lab	53-53
36	Computer Networks- Lab	54-54
37	Java Programming Lab	55-56
38	Internship*	57-57
39	**SECOND YEAR SEMESTER-IV**	58-58
40	Probability and Statistics	59-61
41	Ethical Hacking	62-63

42	Computer Organization	64-65
43	Operating Systems	66-67
44	Micro Processors & Micro Controllers	68-69
45	Python Programming	70-72
46	Ethical Hacking-Lab	73-73
47	Unix Shell Programming -Lab	74-74
48	Micro Processors and Applications- Lab	75-75
49	Python Programming –Lab	76-76
50	**THIRD YEAR SEMESTER-V**	77-77
51	Infrastructure Security (DSE-1)	78-79
52	Computer Forensics (DSE-1)	80-81
53	Data Base Management Systems	82-83
54	Linux Administration	84-86
55	Software Engineering	87-88
56	Machine Learning	89-90
57	Data Base Management Systems- Lab	91-91
58	Web Programming - Lab	92-92
59	Linux Administration - Lab	93-93
60	Machine Learning -Lab	94-95
61	Internship	96-96
62	**THIRD YEAR SEMESTER-VI**	97-97
63	Distributed Systems and Cloud Computing (DSE-2)	98-99
64	Internet of Things (DSE-2)	100-101
65	Web Application Testing (DSE-3)	102-103
66	Python Scripting (DSE-3)	104-105
67	Cryptography and Network Security	106-108
68	Web Application Testing- Lab (DSE-3)	109-109
69	Python Scripting- Lab (DSE-3)	110-110
70	Major Project	111-111
71	Bridge Course-Office Automation	112-113
72	Self-Study-Information Technology Act	114-115
73	Add-On-PowerShell Scripting	116-117

DEPARTMENT OF B.Sc. COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

PROGRAMME OUTCOMES

PO1: Scientific Knowledge: Apply the knowledge of Science, Mathematics, Engineering &Technology fundamentals to solve the complex problems.

PO2: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO3: Problem analysis: Identify, formulate, research literature, and analyse complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO4: Modern tool usage: Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.

PO5: Environment and sustainability: Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.

PO6: Individual and team work: Function objectively as an individual and as a member in diverse teams.

PO7: Communication: Communicate effectively on complex science &technology activities with society at large and able to write effective reports and documentation.

PO8: Life-long learning: Recognise the need and ability to engage in independent and lifelong learning in the context of technological change.

DEPARTMENT OF B.Sc. COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

PROGRAMME SPECIFIC OUTCOMES

PSO1: Ability to apply the knowledge of computer system and design principles in building software and hardware components.

PSO2: Ability to apply knowledge of layered network models, protocols, technologies and topologies as well as incorporating security policies for building network and internet-based applications.

PSO3: Apply the theoretical foundations of computer science in modeling and developing solutions to complex and real-world problems as well as designing and developing application software systems along with the database design and management that meet the automation needs of industry and society.

PSO4: Demonstrate proficiency in hardware and software installation and configuration

PSO5: Examine the elements supporting data communications and systems and show how the various IT components interact to support the Network Communications Management field

B. Sc Computer Science and Information Technology [PROPOSED] for Batch 2022 – 2025 of Academic Year 2024 – 25

Year	Sem	Course – 1	Course – 2	Course – 3	Course – 4	Course – 5	Course – 6	Hours	Credits	
I	I	General English – I (3) (AECC – 1)	Value Education & Personality Development (2) (AECC - 2)	Engineering Drawing and Engineering Workshop (3) (SEC - 1)	Mathematics – 1 (4) (Core - 1)	Electronic Devices and Circuits (4+1) (Core - 2)	Problem solving and programming in C (4+1) (Core - 3)	29	22	AECC =2 SEC =1 CORE =3
	II	General English – II (3) (AECC – 3)	Indian Heritage and Culture (2) (AECC-4)	Engineering Physics (4+1) (GE-1)	Mathematics- II (4) (Core-4)	Logic and Digital Circuits (4+1) (Core-5)	C++ and Data Structures (4+1) (Core-6)	29	24	AECC =2 GE=1 CORE = 3
II	III	Environmental Studies & Gender Sensitization (3) (AECC-5)	(2+1) (GE-2)*	Principles of Information Security (4+1) (SEC-2)	Discrete Mathematics (4) (Core-7)	Computer Networks (4+1) (Core -8)	Java Programming (4+1) (Core-9)	30	25	AECC =1 GE =1 SEC – 1 CORE = 3
	IV	Probability and Statistics (4) (GE-3)	Ethical Hacking (4+1) (SEC-3)	Computer Organization (3) (Core-10)	Operating Systems (4+1) (Core-11)	Microprocessors & Microcontrollers (3+1) (Core-12)	Python Programming (3+1) (Core- 13)	29	25	GE = 1 SEC =1 CORE = 4
III	V	Infrastructure security / computer forensics (4) (DSE-1)	Web Programming lab (2) (SEC-4)	Linux administration (4+1) (Core-14)	Data Base Management Systems (4+1) (Core-15)	Machine Learning (4+1) (core-16)	Software Engineering (4) (Core-17)	29	26	DSE = 1 SEC =1 CORE =4
	VI	IOT / Distributed Systems and Cloud Computing (4) (DSE-2)	Web Application Testing / Python Scripting (4+1) (DSE-3)	Cryptography and Network Security (4) (Core-18)	Project Work (6) (DSE-4)			29	19	DSE=3 CORE=1
Total								175	141	

Legend:
1. Ability Enhancement Compulsory Course (AECC) : 05
2. Generic Elective (GE) : 03
3. Skill Enhancement Course (SEC) : 04
4. Core : 18
5. Discipline-Specific Elective (DSE) : 04

*PC Hardware and Software Installation

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University
Hyderabad-500 007.

B. Sc Computer Science and Information Technology [PROPOSED] for Batch 2025 – 2028 of Academic Year 2025 – 26

Year	Sem	Course – 1	Course – 2	Course – 3	Course – 4	Course – 5	Course – 6		Hours	Credits	
I	I	General English – I (3) (AECC – 1)	Value Education & Personality Development (2) (AECC - 2)	Digital Logic Design & Computer Organization (4+1) (DSC - 1)	Differential Equations, Mean Value Theorems & Fourier series (4) * (DSC - 2)	Computer Networks (4+1) (DSC - 3)	Problem solving and programming in C (4+1) ** (DSC - 4)		30	24	AECC =2 DSC =4
	II	General English – II (3) (AECC – 3)	Indian Heritage and Culture (2) (AECC-4)	Principles of Information Security (4+1) * (DSC - 5)	Vector Calculus & Matrix Algebra (4) * (DSC - 6)	Operating Systems (4+1) (DSC - 7)	Data Structures with C (4+1) * (DSC - 8)	Planet (NON-CGPA)	30	24	AECC =2 DSC = 4
II	III	(GE-2) * (2+1)	Environmental Studies & Gender Sensitization (3) (AECC-5)	Data Base Management Systems (4+1) * (DSC - 9)	Discrete Mathematics (4) * (DSC - 10)	Web Technology (1+1) (SEC - 1)	Python Programming (4+1) ** (DSC - 11)		30	22	AECC =1 GE =1 SEC =1 DSC = 3
	IV	Probability and Statistics (4) (DSC-12)	Data Visualization Through Power BI (1+1) (SEC-2)	Machine Learning (4+1) (DSC - 13)	Distributed Systems (4) (DSC - 14)	Server Administration Tools (4+1) (DSC - 15)	Java Programming (4+1) * (DSC - 16)	Internship (2) (Summer Vacation)	30	25	SEC =1 DSC = 5
III	V	Infrastructure security / computer forensics (4) (DSE-1)	Artificial Intelligence/ Bigdata-Analytics (DSE-2) (4)	Linux administration Tools (4+1) (DSC - 17)	Python Scripting (4+1) (DSC - 18)	Cloud Computing (4) (DSC – 19)	Software Engineering (4+1) (DSC - 20)		30	27+2	DSE = 2 DSC = 4
	VI	IOT / Software Testing (4) (DSE-3)	Deep learning / Natural Language Processing (4) (DSE-4)	Scalable Architecture (4+1) (DSC - 21)	Project Work (6) (DSE-4)				30	19	DSE=2 DSC = 1
Total									180	143	

Legend:

1. **Ability Enhancement Compulsory Course (AECC) : 05**
2. **Generic Elective (GE) : 01**
3. **Skill Enhancement Course (SEC) : 02**
4. **Discipline-Specific Core : 21**
5. **Discipline-Specific Elective (DSE) : 04**

***PC Hardware and Software Installation**

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University
Hyderabad-500 007.

Year-wise and Semester-Wise Distribution of Courses
Department of B.Sc. Computer Science and Information Technology
First Year First Semester
Academic Year 2025-26 of 2025 -28 Batch (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	I	EN23101	General English-I (AECC-1)	3	3	40	60	100	3
2	I	VE18101	Value Education and Personality Development (AECC-2)	2	3	40	60	100	2
3	II	BS25101	Differential Equations and Elementary Number Theory (DSC-2)	5	3	40	60	100	4
4	II	BS25102	Digital Logic Design & Computer Organization (DSC-1)	4	3	40	60	100	4
5	II	BS24104	Problem Solving and Programming in C (DSC-4)	6	3	40	60	100	4
6	II	BS24102	Computer Networks (DSC-3)	4	3	40	60	100	4
PRACTICALS									
7	II	CSIT25101	Computer Networks Lab (DSC-3)	2	3	40	60	100	1
8	II	CSIT25102	Digital Logic Design (DSC-1)	2	3	40	60	100	1
9	II	CSIT25103	C Programming -Lab (DSC-4)	2	3	40	60	100	1
Total				**30**	---	320	480	800	**24**

***Ability Enhancement Compulsory Course (AECC)**
*** Discipline Specific Core (DSC)**

GENERAL ENGLISH-I

Credits: 3 **Semester: I**

Course Code: EN23101 **No of Lecture Hours: 45**

Course Objective:

- Through exposure to contemporary passages, the students would be able to have a grasp on the language of today, with specific emphasis on the Listening, Speaking, Reading and Writing skills.
- Through the components of a passage, vocabulary and grammar section, speaking component and writing segments, there is a holistic development for language proficiency and fluency.

Course Outcome:

CO1: To distinguish between words which are either spelt or pronounced alike, yet render distinct meanings; imparting a sound clarity on everyday usage of language, and for developing the art of parallel listening and writing

CO2: To construct vocabulary and to gain understanding on the tense component, a pivotal constituent for language structuring and vocabulary building

CO3: To identify with economical word constructions, paying specific attention in constructing sound writing skills

CO4: To interpret functional grammar, the basic part involved in sentence constructing to improve linguistic skills

CO5: To develop communication skills to provide a platform for language efficiency for effective language deliver

Course Content	Hours Allotted	Pedagogy
Module I: Title: Fundamentals of Communication-I **Short Story - The Mystery Story (source – teacherluke.co.uk).** • Present Tense • Past Tense • Future Tense • Paragraph Writing	**(9)** 1 2 2 2 2	Power point presentations / Lectures
Module II: Title: Language Proficiency for Effective Writing and Speaking Skills-I **Poem- Goodbye Party for Miss Pushpa T.S. by Nissim Ezekiel** • Subject- Verb Agreement • Punctuations • Review Writing	**(9)** 2 3 2 2	Case Studies / Review of research articles

Module III: Title: Wit and Humour **From the text Atea Party by Ruth Prawer Jhabvala** • Explanation of the text • Grammar -------Nouns, Articles • Vocabulary --- Homonyms, Homophones, Homographs • Writing Skill ------Note- Making	**(9)** 2 2 3 2	Assignments
Module IV: Title: Human Values **From the text "India's Contribution to World Unity"** • Explanation of the text • Grammar----adverbs • Vocabulary----Adjective and Adverb Suffixes • Writing Skill------Formal Letters and Curriculum Vitae	**(9)** 1 2 2 2 2	Lectures
Module V: Title: From the text "Sachin Tendulkar" • Explanation of the text • Grammar----- Adjectives, Comparison of Adjectives • Vocabulary-----Common Errors, Commonly Misspelt words, Commonly Confused Words Writing Skill References and Bibliographies	**(9)** 3 3 3	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING**: Skills Annexe. Functional English for Success. Orient Black Swan
2.	**SUGGESTED READING**: • Balasubramaniam, M. 1985 Business Communication. New Delhi: Vani Educational Books. • Krishna Mohan and Meera Banerjee, 1990. Developing Communication Skills. New Delhi: Macmillan India Ltd. • Krishnaswamy.N. and Sriraman, T. 1995. Current English for Colleges. Madras: Macmillan India Ltd. • Narayanaswamy.V.R. 1979 Strengthen Your Writing. New Delhi: Orient Longman. • Sharma.R.and Krishna Mohan. Business Correspondence. 1978. New Delhi. Tata McGraw-Hill Publishing Co

VALUE EDUCATION & PERSONALITY DEVELOPMENT

Credits: 2 **Semester: I**

Course Code: VE18101 **No of Lecture Hours: 30**

Course Objective:

- To produce intellectually competent, morally upright, socially committed, spiritually inspired citizens in the service of the nation and the world.
- To transform the students into conscientious citizens through holistic education and contribute to nation building

Course Outcome:

CO1: Differentiate accepted norms and counter values and to identify the various dimensions of Human Development

CO2: Demonstrate Love and Experience of God and identify the Basic Issues of Life and Happiness as a life goal

CO3: Understand the importance of Concern for others and critique the various problems that deter the growth of the society

CO4: Recognize the traits of a good personality and practice Self-exploration

CO5: Interpret the Purpose of Life and Goal Setting and demonstrate Self- management

Course Content	Hours Allotted	Pedagogy
Module I: Title: Introduction to Ethics • Why Value Education? • Reasons to have Ethics for Life • Accepted Norms and Counter Values • Dimensions of Human Development: Physical, Intellectual, Emotional, Moral, Spiritual and Social	**(6)**	Power point presentations / Lectures
Module II: Title: Approach to Life • Conscience and Pseudo-Conscience • Happiness as Life-goal • Values revealed and lived in Religions • Experience of God • Love: The three components of Love • Some of the basic stages and issues of Life: Family, Love, Sex, Marriage	**(6)**	Case Studies / Review of research articles
Module III: Title: Concern for others • Self and Another • Human Context • Moral Problems of a Society / True Society : Social	**(6)**	Assignments

Desire, Social Fear, Social Silence, Social Indifference		
Module IV: Title: Transformation of self • Definitions of personality • Characteristics of personality • Elements of personality • Traits of good personality • Self-Identity, self-concept • Self-Discovery, self-acceptance • Self-Esteem **WORK SHEET (1): Self Estimation**	**(6)**	Lectures
Module V: Title: Life enrichment Skills • Purpose of life - Goal setting • Characteristics of Goals • Building Relationships • Time Management • Stress Management • Emotional Management • Conflict Management • Team Management (Group Dynamics) **WORK SHEETS (1) & (2): 1) Anger Management** **2) Team Management**	**(6)**	Assignments / Lectures

Learning Resources	
1.	Textbook: 1. Human Values - Development Programme - AIACHE 2. In Harmony

DIFFERENTIAL EQUATIONS & ELEMENTARY NUMBER THEORY

Credits:4 **Semester: I**

Course Code: BS25101 **No of Lecture Hours:75**

Course Objective:

- To provide strong foundation on differential equations and to enable students to understand the study of the basic structure and properties of integers. Learning Number Theory helps improve one's ability of mathematical thinking.

Course Outcome:

CO1: Categorize the differential equations with respect to their order and linearity. Solve differential equations of first order using numerical and analytical methods such as Integrating Factors.

CO2: Analyse and solve basic application problems described by first order differential equations. Such as orthogonal trajectories.

CO3: Identify methods and techniques used in number theory, and **solve** challenging problems in Number Theory, Diophantine equations.

CO4: Demonstrate knowledge and understanding of topics including divisibility, prime numbers, congruences,

CO5: Develop a deeper conceptual understanding of the theoretical basis of number theory and cryptography.

Course Content	Hours Allotted	Pedagogy
Module I: Title: DIFFERENTIAL EQUATIONS OF THE FIRST ORDER AND FIRST DEGREE	**(15)**	
• Introduction- Equations in which Variables are Seperable	2	Power point presentations / Lectures
• Linear differential equations	3	
• Differential Equations reducible to linear form Bernoulli's equation	3	
• Exact Differential Equations- Integrating factors	7	
Module II: Title: LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS	**(15)**	
• Orthogonal trajectories - Cartesian coordinates- Polar coordinates.	5	Case Studies / Review of research articles
• Auxiliary equation, complementary function, particular integral	5	
• Working rule for finding P.I. when $X=e^{ax}$, Sin ax, Cos bx, x^m, $e^{ax}v$, $x^m.v$,	5	
Module III: Title: EARLY NUMBER THEORY	**(15)**	
• Divisibility- The Division algorithm	4	Assignments
• Euclid' algorithm- The Diophantine equation ax + by = c	4	

• Greatest Common Divisor - Properties of G.C.D • Primes – Fundamental theorem of Arithmetic.	4 3	
Module IV: Title: CONGRUENCES • Congruences – Properties- Applications of Congruences. • Linear Congruences - Solutions of Congruences. • Fermat's theorem and its applications. • Wilson's theorem and its applications.	**(15)** 3 4 4 4	Lectures
Module V: Title: EULER'S THEOREM • The functions τ and σ • Euler Totient function φ(n) • Euler's Theorem • Some properties of The Phi -function • An application to cryptography	**(15)** 3 3 2 4 3	Assignments / Lectures

Learning Resources	
1.	Text Book: 1. Zafar Ahsan. **Differential Equations and their Applications.** 2nd Edition. Prentice Hall of India, (Units I and II) 2. David M. Burton 2004 **Elementary Number Theory** Universal Book Stall New Delhi (Units III, IV & V).

DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION

Credits:4 **Semester: I**

Course Code: BS25102 **No of Lecture Hours:60**

Course Objective:

- To understand the basic theoretical concepts of digital systems like the binary system and Boolean algebra.
- To express real life problems in logic design terminology.
- To use Boolean algebraic formulations to design digital systems.
- To design using combinational/sequential circuits.
- To understand the Instruction execution stages.
- To explain the functions of the various computer hardware components.

Course Outcome:

CO1: Student could able to design, understand the number systems.

CO2: Student could able to design, understand the combinational sequential circuits.

CO3: Student could able to implement and analyse algorithms for fixed-point and floating-point arithmetic operations, memory locations, machine addresses, addressing modes, and instruction formats.

CO4: Student could able to understand CPU organization, register transfers, instruction execution, bus organization, memory organization and memory management techniques.

CO5: Student could able to comprehend I/O systems, interrupt handling, device control, DMA, buses, and standard I/O interfaces for effective communication between peripheral devices and the CPU.

Course Content	Hours Allotted	Pedagogy
Module I: Title: • **Basic Structure of Computers** : Computer Types, Functional units, o Basic operational concepts, Bus structures, Software, Performance, o multiprocessors and multi computers, Computer	**(12)** 6	Power point presentations / Lectures

Generations. • **Data Representation:** Binary Numbers, Fixed Point Representation. o Floating– Point Representation. Number base conversions, o Octal and Hexadecimal Numbers, complements, Signed binary numbers, o Binary codes.	6	
Module II: Title: • **Digital Logic Circuits**: Basic Logic Functions, Logic gates, universal logic gates, 6Minimization of Logic expressions. • Flip-flops (RS, JK, D, MS-JK), Combinational Circuits (Half Adder, Full Adder), Decoders(3 to 8), Multiplexers.	**(12)** 6 **6**	Case Studies / Review of research articles
Module III: Title: • **Computer Arithmetic**: Algorithms for fixed point and floating-point addition, subtraction, multiplication and division operations. • **Instruction Set & Addressing**: Memory Locations and Addresses, Machine addresses and sequencing, Various Addressing Modes, Instruction Formats.	**(12)** 6 6	Assignments
Module IV: Title: • **Processor Organization**: Introduction to CPU, Register Transfers, Execution of 6Instructions, Multiple Bus Organization. • **Microprogrammed Control Memory Organization:** Concept of Memory, RAM, ROM memories, cache memories, virtual memory, secondary storage, memory management requirements.	**(12)** 6 6	Lectures
Module V: Title: **Input / Output Organization**: • Introduction to I/O, • Interrupts- Hardware, • Enabling and disabling Interrupts, Device Control, Direct memory access	**(12)** 2 5 5	Assignments / Lectures

Learning Resources	
1.	1. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson. 2020 2. Computer Organization – Carl Hamacher, Zvonko Vranesic, Safwat Zaky, fifth edition, McGraw Hill. 2019 3. Computer Architecture and Organization- An Integrated Approach, Miles Murdocca, Vincent Heuring, Second Edition, Wiley India. 2010 . **SUGGESTED READINGS:** 1. Digital Design – Third Edition, M.Morris Mano, Pearson Education/ PHI. 2023 2. Computer- organization and Design- David A. Paterson and John L.Hennessy-Elsevier. 2014 3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson. 2010 4. Fundamentals or Computer Organization and Design, - Sivarama Dandamudi Springer Int. Edition. 2002 5. Fundamentals of Logic Design, Roth, 5th Edition, Thomson. 2003

PROBLEM SOLVING AND PROGRAMMING IN 'C'

Credits: 4 **Semester: I**

Course Code: BS24104 **No of Lecture Hours: 75**

Course Objective:

- To understand major programming constructs this serves as the basis for any programming language

Course Outcome:

CO1: Explain Basic concepts of C programming
CO2: Develop programs using 'C' control structures.
CO3: **Organize** data using arrays and strings
CO4: **Sub divides** larger problems into smaller ones using 'C' functions.
CO5: **Create** programs using the concept of structures, union and file handling in 'C'

Course Content	Hours Allotted	Pedagogy
Module I: Title: • Introduction to C programming • Structure of C program • Files used in a C program • Compiling and executing C program • C tokens, Constants, Character set in C • Keywords, Identifiers	**(15)** 3 2 3 2 3 2	Power point presentations / Lectures
Module II: Title: • Data Types in C, Enumerated data types, typedef • Variables and scope of a variables • Data input and output statements in C • Operators and expressions • Type conversion and Type Casting • Conditional Branching Statement – if, if-else, if-else-if, switch case	**(15)** 2 2 2 3 2 4	Case Studies / Review of research articles
Module III: Title: • Iterative Statements – while loop, do-while loop, for loop • Nested loops, break and continue statements, goto statement • Arrays - Single and double dimensional arrays • String- string input output functions • string manipulation functions	**(15)** 3 3 3 3 3	Assignments
Module IV: Title: • Function- Declaring, defining and invoking functions	**(15)** 2	Lectures

• Categories of functions-Built-in functions • Passing parameters to functions – call by value & call by reference • Storage classes • Recursion • Pointers - Declaration, passing pointer to functions • Pointers and one-dimensional arrays • Dynamic memory allocations.	2 2 2 2 2 2 1	
Module V: Title: • Structures - Simple structures, nested structure, Array of structures • Unions-Differences between Structures and Unions. • File handling - Various modes, File operations – fopen(), fclose() • File input output functions – fputc(), fgetc(), fputs(), fgets(), getw(), putw(), getc(), putc(), fprintf(), fscanf(), getchar(), putchar() • Random accessing file – fseek(), ftell(), rewind()	**(15)** 3 3 3 3 3	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** **1.** TharejaReema.,**Programming in C**-2016,2nd Edition 2. TharejaReema. 2016. **Programming in C.** 2nd edition**.** New Delhi : OUP. 3. Kanetkar Yashwant. 2018. **Let us C.** 16th Edition**.** New Delhi : BPB. 4. Gottfried Byron. 2010. **Programming with C (**Schaum's Outline Series**).** 3rd Edition. New Delhi: McGraw Hill Education

COMPUTER NETWORKS

Credits:4 **Semester: I**

Course Code: BS24102 **No of Lecture Hours: 60**

Course Objective:

- To get familiarized with fundamental concepts of computer networks.
- To gain expertise in various layers of the TCP/IP model.

Course Outcome:

CO1: **Identify** basic computer network topologies and protocols and explain Data Communication System components
CO2: **Classify** different error detecting techniques.
CO3: C**onstruct** subnetting and routing mechanisms.
CO4: **Sketch** the routing protocols and analyze how to assign the IP addresses for the given network
CO5: **Develop** network design and implementation

Course Content	Hours Allotted	Pedagogy
Module I: Title: Introduction:	**(12)**	Power point presentations / Lectures
• Data Communications, networks, Protocols and Standards	2	
• OSI model, layers in OSI model/IP Protocol suite	2	
Analog and Digital, Transmission impairment		
• Transmission Media-Guided media, Connecting Devices	2	
• (Hubs, Repeaters, Bridges, Routers-Only Definitions)	2	
• Digital Transmission- digital-to-digital conversion	2	
• Multiplexing: Frequency-division, Wavelength and Time Division	2	
Module II: Title: DATA LINK LAYER	**(12)**	Case Studies / Review of research articles
• Error detection and correction-Parity, check sum, CRC, Hamming code	2	
• Data Link Control: Framing, flow and error control	3	
• Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Piggybacking	3	
• HDLC, Random Access- ALOHA, CSMA, CSMA/CD, CSMA/CA	2	
• Wired LANs- Ethernet	2	
Module III: Title: NETWORK LAYER	**(12)**	Assignments
• IP address space- Introduction	2	
• Classful and Classless addressing, subnetting and supernetting	2	
• IPv4- datagram, Fragmentation, checksum, options	3	
• Internet Control Protocols- ICMP, IGMP, ARP and RARP	2	

• Delivery, Forwarding, Unicast routing protocols- RIP, OSPF, BGP	3	
Module IV: Title: TRANSPORT LAYER • Process-to-Process Delivery, UDP-well known ports, user datagram, checksum • UDP Operation, use of UDP • TCP- process to process communication, Numbering bytes, TCP services • Flow control- silly window syndrome, Error Control • TCP connection, State transition diagram, Congestion control, Timers, Options	**(12)** 2 2 3 2 3	Lectures
Module V: Title: APPLICATION LAYER • DNS- Namespace, domain name space, distribution of name space • DNS in internet, resolution, DNS messages, types of records • TELNET, E-mail- architecture, message transfer agent: SMTP • Message Access Agent: POP, FTP • WWW and HTTP- architecture, web documents, HTTP	**(12)** 2 2 3 2 3	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** 1. Forouzan, Beharouz A,2023,7th edition,**Data Communications and Networking** 2. Forouzan, Beharouz A. 2011. **Data Communications and Networking**. 3rd Edition. New Delhi: Tata Mc Graw Hill.(UNIT-I,II) 3. Forouzan, Beharouz A. 2005. **TCP/IP Protocol Suite**. 3rd Edition. New Delhi: Tata Mc Graw Hill.(UNIT-III-V)
2.	**SUGGESTED READING** • Tanenbaum, Andrew S. 2008. **Computer Networks**. 4th Edition. New Delhi: Pearson Education.

COMPUTER NETWORKS LAB

Credits: 1 **Semester: I**

Subject Code: CSIT25101 **No. of Practical Hours: 30**

Objective:

Hands-On training regarding the design, troubleshooting and evaluation of computer networks

Outcome:

Demonstrate basic switching concepts, VLAN, routing, dynamic and static routing protocols using Cisco packet tracer software (Freeware)

No. of Hrs	Topic

1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using crimping tool
2. study the Network Devices in Detail
3. Study of Network IP
4. Connect the Computers in LAN
5. Study of Basic Networking Commands
6. Configure a Network Topology using Packet Tracer
7. Performing an Initial Switch Configuration
8. Performing an Initial Router Configuration
9. Interpreting Ping and Traceroute Output
10. Observing Static and Dynamic Routing
11. Configure a Network Using Distance Vector Routing Protocol
12. Configure a Network Using Link State Vector Routing Protocol

DIGITAL LOGIC DESIGN PRACTICAL

Credit:1 **Semester: I**

Course Code: CSIT25102 **No. of practical hours: 30**

Objectives:

- To implement simple logic operations using combinational logic circuits.
- To design combinational and sequential logic circuits in virtual and real environments.

Outcome:

- Students will be able to implement and design simple logical operations using combinational and sequential logic circuits.

List of Experiments:

1. Study of Logic Gates.
2. Design of Adders and Subtractors (Half, Full and Binary).
3. Study of Magnitude Comparator.
4. Code Converter (Excess-3 code).
5. Parity Generators and Checkers.
6. Study and Design of Flip Flops using gates and IC's.
7. Design of Registers using Flip Flops and ICs.
8. Design of Counters using Flip Flops and ICs.
9. Simulation experiments: Adder, subtractors.
10. Verification of RS & JK flipflops Truth tables.

C- PROGRAMING LAB

Credits: 1 **Semester: I**

Course Code: CSIT25103 **No. of Practical Hours: 30**

Objective: To develop applications using structured programming.

Outcome: Students will be able to write, compile and debug programs in C language.

1. Programs to implement various arithmetic operators
2. Programs to find area of circle, area of rectangle, area of square
3. Programs to find gross salary of employee
4. Programs using if, if-else, if-else if –condition statements
5. Program to stimulate calculator using switch case
6. Programs using break and continue
7. Program to print sum of "N" natural numbers
8. Program to print factorial of given numbers using loops
9. Program to print multiplication table of a given number
10. Program to LOYOLA five times
11. Program to find sum of digits and reverse of a given number
12. Program to check if the given number is palindrome or not
13. Program to find the Fibonacci series
14. Program to check the year is leap year or not
15. Program to find swap of two numbers
16. Program to print a pattern
17. Program to solve quadratic equation
18. Programs to display array elements, sum of array elements, smallest, greatest array elements
19. Program to check if the given number is Armstrong number
20. Programs using 2-D array
21. Program to find the element in an array
22. Program to perform operations on matrices (addition, subtraction, multiplication, transpose)
23. Programs using strings and functions
24. Program to find call by value and call by reference
25. Program to find factorial using recursion
26. Program to find the sum of array elements using pointers
27. Program to accept and display book details using structures
28. Program to maintain employee details using structures
29. Program to Read a file and display its content using files
30. Program to count number of spaces, tabs and newlines in a file

Year-wise and Semester-Wise Distribution of Courses
Department of B.Sc. Computer Science and Information Technology
First Year Second Semester
Academic Year 2025-26 of 2025 -28 Batch (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
	THEORY								
1	I	EN23201	General English-II (AECC-3)	3	3	40	60	100	3
2	I	IC23201	Indian Heritage and Culture (AECC-4)	2	3	40	60	100	2
3	II	BS24203	Operating Systems (DSC-7)	4	3	40	60	100	4
4	II	BS24201	Matrices and Vector Calculus (DSC-6)	5	3	40	60	100	4
5	II	CSIT25201	Principles of Information Security (DSC-5)	5	3	40	60	100	4
6	II	BS24204	Data Structures With C (DSC-8)	5	3	40	60	100	4
	PRACTICALS								
7	II	CSIT25202	Operating Systems Lab (DSC-7)	2	3	40	60	100	1
8	II	CSIT25203	Principles of Information Security Lab (DSC-5)	2	3	40	60	100	1
9	II	CSIT25204	Data Structures with C Lab (DSC-8)	2	3	40	60	100	1
Total				**30**	**-**	360	540	900	**24**
10	III	PL18001	PLANET* (Outreach)	-	-	-	-	-	-

***Ability Enhancement Compulsory Course (AECC)**
***Skill Enhancement Course (SEC)**
***Program of Loyola Academy for Neighbourhood Empowerment and Transformation (PLANET)**

PROFESSOR
Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University
Hyderabad-500 007.

GENERAL ENGLISH -II

Credits: 3 **Semester: II**

Course Code: EN23201 **No of Lecture Hours: 45**

Course Objective:

- To enhance the learners' communication skills by giving adequate exposure in reading, writing, listening and speaking skills and the related sub-skills.
- To develop oral and written communicative skills among the students so that their employability enhances and English becomes the medium of their livelihood and personality.

Course Outcome:

CO1: To identify a sound understanding on the formation of words and to demonstrate the functional grammatical component in the sentence.
CO2: To paraphrase ideas and thoughts in a coherent, neat and organized manner to utilize the writing skills for sound writing propagandas.
CO3: To create an understanding on Indian Literature, alongside to develop and chisel their communication skills.
CO4: To recognize the moral element which underlies in the short story; an exposure to informal language.
CO5: To develop listening and speaking skills through effective sentence constructions and efficient delivery.

Course Content	Hours Allotted	Pedagogy
Module I: Title: Fundamentals of effective communication- II Flash Fiction- The Mice by Lydia Davies • Simple, Complex and Compound Sentences • Conversion of sentences • Information Transfer	**(9)** 1 3 2 3	Power point presentations / Lectures
Module II: Title: Language Proficiency for Effective speaking and Writing Skills-II **Short Story- The Face on the Wall by E V Lucas** • Active and Passive Voice • Conjunctions • Essay Writing	**(9)** 2 3 2 2	Case Studies / Review of research articles
Module III: Title: Health **From the text "Three Days to See"** • Explanation of the text • Grammar -------Usage of Modal Auxiliary Verbs	**(9)** 3 2	Assignments

• Vocabulary --- Collective Nouns, Technical Vocabulary • Writing Skill ------News Paper Report	2 2	
Module IV: Title: Short Story **From the text "Leela's Friend" by R.K.Narayan** • Explanation of the text • Grammar----Phrasal Verbs, Wh- Questions • Vocabulary----Noun and Verb Suffixes • Writing Skill------Writing a Narrative	**(9)** 3 2 2 2	Lectures
Module V: Title: Inspiration **From the text "The Last Leaf" by O. Henry** • Explanation of the text • Grammar----- Prepositions • Vocabulary-----Idioms • Writing Skill----- Précis Writing	**(9)** 3 2 2 2	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** 1. **Epitome of Wisdom**. Guntur: Maruthi Publications.
2.	**SUGGESTED READING** 1. Mohan Krishna and Banerjee Meera. 1990. **Developing Communication Skills**. New Delhi:Macmillan India Ltd. 2. Krishnaswamy, N. and Sriraman,T. 1995. **Current English for Colleges**. Madras: Macmillan India Ltd. 3. Narayanaswamy, V.R. 1979.**Strengthen Your Writing**. New Delhi: Orient Longman. 4. Sharma, R.C. and Mohan Krishna. 1978. **Business Correspondence**. New Delhi: Tata McGraw-Hill Publishing Co.

INDIAN HERITAGE AND CULTURE

Credits: 2 **Semester: II**

Course Code: IC23201 **No of Lecture Hours: 30**

Course Objective:

- To apprise the students with a sound background of Indian Culture.
- To equip the students with social & community problems of India.
- To prepare the student for civil service exams where Indian Heritage & Culture paper is compulsory for all the streams.

Course Outcome:

CO1: Students will have knowledge about Indian Customs and Traditions.
CO2: Students can make use of the subject knowledge to attempt all kinds of competitive exams, especially civil services
CO3: The Subject helps the student community to have knowledge of historical and contemporary social, religious and political issues of the nation

Course Content	Hours Allotted	Pedagogy
Module I: Title: **INTRODUCTION – ANCIENT INDIAN HERITAGE AND CULTURE** • Meaning of the culture-Characteristics of Indian culture • Indus valley civilization and Vedic/Aryan Culture • Mauryas and Guptas • Ashoka the great and Harshavardhana • South Indian Kingdoms-Satavahanas, Pallavas, Cholas Development of the art and architecture-contributions of Buddhism and Jainism	**(6)**	Power point presentations / Lectures
Module II: Title: **MEDIEVAL INDIA – INFLUENCE OF ISLAM ON INDIAN CULTURE** • Cultural Development under the Delhi Sultanate and Mughals • Sufi and Bakti Movement in Medieval period • Cultural Achievements of Kakatiyas and Qutubshahis Development of Art and architecture during medieval India	**(6)**	Case Studies / Review of research articles

Module III: Title: **IMPACT OF WEST AND REFORM MOVEMENTS** • Influence of Western culture on Indian Society • 19th century Socio Religious Reform Movement –Raja Ram Mohan Roy Ishwara Chandra Vidyasagar and Veerasalingam • Subaltern Movements in India– Jyothirao Phule-Savitribai Phule E.V Ramaswamy Naikar –Narayana Guru-Dr.B.R.Ambedkar • Indian National Movement-Moderate, Extremist and Gandhian Era	**(6)**	Assignments
Module IV: Title: **RELIGION AND COSTITUTIONAL INSTITUTIONS** • Perceptions of all major religions-a critical analysis • Rise of communalism in Indian society • Democratic system in India and its functions-Evolution of the constitution and organs of democracy	**(6)**	Lectures
Module V: Title: **SOCIAL GROUPS AND RIGHTS** • Fundamental rights, • Women, Children and LGBTQ • Tribal Culture-their issues	**(6)**	Assignments / Lectures

Learning Resources	
1.	Textbook: Textbook name, the author's last name, the year, edition.
2.	**REFERENCE BOOKS** 1. Jha, Dr K.N. 2006. **Studies in ancient & Medieval India**. COSMOS Book hive Ltd: Gurgaon. 2. Mahajan, V.D. 2008. **Ancient India**. S.Chand, New Delhi. 3. Manasseh, Dr P. 2010. **An Overview of Indian Culture**. Gamaleil Publishers, Hyderabad. 4. Malpani, Madanlal & Malpani, Shamsunder. 2014. **Indian Heritage and Culture**. Kalyani Publishers, Ludhiana. 5. Mhaske, Dr R.H. 2012. **Human Rights, Social Justice and Political Challenges**. Chandralok Prakashau, Kanpur. 6. Singh, Gurdip & Ahuja, V.K. 2012. **Human Rights in 21st Century**. Universal Law Publisher, New Delhi.

OPERATING SYSTEMS

Credits: 4 **Semester: II**

Course Code: BS24203 **No of Lecture Hours: 60**

Course Objective:

- To learn core ideas in operating systems, process management, memory protection, CPU scheduling, concurrent programming, deadlocks and File systems.

Course Outcome:

CO1: **Explain** functions, types and structures of operating system

CO2: **Analyze** various process management concepts including scheduling and synchronization

CO3: **Illustrate** the concepts of memory management and I/O system.

CO4: **Solve** issues related to file system interface.

CO5: **Choose** an appropriate Page replacement algorithm

Course Content	Hours Allotted	Pedagogy
Module I: Title:	**(12)**	
• Introduction -Define Operating System, mainframe system, desktop systems	2	
• Multiprocessor systems, distributed systems, clustered systems	2	Power point presentations / Lectures
• Real-time systems, hand-held systems	1	
• Operating system structures-system components	2	
• Operating system services, system calls	2	
• system programs, system structure, virtual machines	3	
Module II: Title:	**(12)**	
• Process concept-process concept, process scheduling	3	
• Operation on processes, cooperating processes	3	Case Studies / Review of research articles
• Inter process communication	2	
• Process scheduling-basic concepts, scheduling criteria, scheduling algorithm	4	
Module III: Title:	**(12)**	
• Process synchronization-critical section problem	3	
• Semaphores, monitors	3	
• Deadlocks-deadlock characterization, methods for handling deadlocks	3	Assignments
• Deadlock prevention, Deadlock avoidance, Deadlock detection	3	
Module IV: Title:	**(12)**	
• File system-file concept, access methods	2	Lectures

• Directory structure, file system mounting, file system sharing. • File system implementation -file system structure, file system implementation. • Directory implementation, allocation methods, free space management	3 3 4	
Module V: Title: • Memory management-swapping, contiguous memory allocation • Fragmentation-internal and external fragmentation • Paging, segmentation, segmentation with paging. • Virtual memory management-demand paging • Page replacement algorithms, Thrashing and working set model.	**(12)** 2 2 3 2 3	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** 1. Silber Schatz Abraham, Operating System Concepts,2021,10th Edition 2. Silber Schatz Abraham, Galvin Peter, B. and Gagne Greg. 2006. Operating System Concepts. 6th Edition. India: Wiley.
2.	**SUGGESTED READING** 1. Tanenbaum Andrew, S. 2001. **Modern Operating Systems.** New Delhi: Pearson Education

MATRICES & VECTOR CALCULUS

Credits: 4 **Semester: II**

Course Code: BS24201 **No of Lecture Hours:75**

Course Objective:

- The objective of this course is to present a user-friendly introduction to Matrices and Vector Calculus and its many applications

Course Outcome:

CO1: Understand to find the rank of a matrix and to solve systems of linear equations applying matrix techniques.
CO2: Determine Eigenvalues and Eigenvectors of a given matrix and apply these concepts to quadratic forms.
CO3: Differentiate and anti-differentiate a vector-valued function presented in symbolic form, **Find** the divergence and curl of a vector field
CO4: Use the gradient operator to calculate the directional derivative of a function
CO5: Understand the various integral theorems relating to line, surface and volume integrals

Course Content	Hours Allotted	Pedagogy
Module I: Title: Systems of Linear Equations : • Rank Of a Matrix • Rank - Echelon Form • Rank - Normal form • Solution of Linear Systems • Homogeneous Equations, Non-Homogeneous Equations	**(15)** 1 3 3 2 6	Power point presentations / Lectures
Module II: Title: Eigenvalues-Eigenvectors • Eigenvalues-Eigenvectors–Properties • Cayley-Hamilton Theorem (Without Proof) Inverse and powers of a matrix by using Cayley-Hamilton theorem • Quadratic Forms-Reduction of Quadratic form to canonical form	**(15)** 5 5 5	Case Studies / Review of research articles
Module III: Title: • Vector Differentiation and ordinary derivatives of vectors • Continuity- Differentiability Gradient of a scalar field • Gradients, conservative fields and potentials • Applications of the gradient- Directional Derivative	**(15)** 3 3 4 5	Assignments
Module IV: Title: • Divergence of a Vector Point function - Properties • Curl of a Vector Point function - Properties	**(15)** 5 5	Lectures

• Problems with Divergence and Curl	5	
Module V: Title: • Vector Integration- Line Integrals-Surface integrals- Volume integrals • Green's Theorem (without proof)- Simple problems on Green's Theorem • Gauss's divergence theorem (without proof)- Simple problems on Gauss's theorem • Stoke's Theorem (without proof)- Simple problems related to Stoke's Theorem	**(15)** 3 4 4 4	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** 1. Matrices By AR.Vasishtha Krishna prakashan mandir ,Meerut. 2. P.C. Matthews, Vector 3. Calculus 4. J.N. Sharma, A.R. Vasistha, 2013 **Vector Calculus**–Meerut: Krishna Prakashan, Mandir, for units (IV, V)

PRINCIPLES OF INFORMATION SECURITY

Credits: 4 **Semester: II**

Course Code: CSIT25201 **No of Lecture Hours: 75**

Course Objective:

- To compile, analyze, and assess the applicability of best practices in addressing information
- To address the issues relevant to the cyber security community

Course Outcome:

CO1: **Explain** concepts of confidentiality, availability and integrity (CIA) in context of Information security

CO2: **Identify** the risk, assess and risk control strategies.

CO3: **Demonstrate** expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention

CO4: **Analyze** systems, tools, methods, and techniques for securing digital information within an organization

CO5: **Develop** encryption and decryption techniques.

Course Content	Hours Allotted	Pedagogy
Module I: **Title: INTRODUCTION OF INFORMATION SECURITY**	**(15)**	Power point presentations / Lectures
• Introduction to Security, Critical Characteristics of Information	4	
• NSTISSC Security Model, Components of Information Security, Balancing Information Security and Access	4	
• Approaches to Information Security Implementation, System Development Life Cycle	3	
• Security System Development Life Cycle, Information Security: Art of Science	4	
Module II: **Title: THE NEED FOR SECURITY**	**(15)**	Case Studies / Review of research articles
• Important functions of Information Security	3	
• Threats and category of Threats	4	

• Attacks and Types of Attacks • Secure Software development	4 4	
Module III: **Title: SECURITY TECHNOLOGY: FIREWALLS AND VPNS** • Firewalls: Processing modes, categorizations • Firewall Architecture, Choosing a Firewall • Configuring and Managing a Firewall • Firewall Rules • Protecting Remote Connections: Securing Authentication with Kerberos • VPN: Transport and Tunnel Mode	**(15)** 2 3 3 2 3 2	Assignments
Module IV: **Title: SECURITY TECHNOLOGIES: INTRUSION DETECTION AND OTHER SECURITY TOOLS** • IDPS: terminology, types of IDPS • IDPS Detection Methods, IDPS Response Behavior • Strengths and Limitations of IDPS • Honeypots, Honeynets and Padded Cell Systems • Port Scanners, Firewall Analysis Tools • Operating System Detection Tools, Vulnerability Scanners • Packet Sniffers, Wireless Security Tools	**(15)** 3 2 2 2 2 2 2	Lectures
Module V: **Title: CRYPTOGRAPHY** • Terminology, Cryptographic Tools, PKI, • Digital Signature, Digital Certificate and Steganography • Protocol for Secure Communication: Securing the Internet with SSL • Securing Email with S/MIME, PGP • Securing web Transactions SET • Securing wireless Network with WEP and WPA • Securing TCP/IP with IPSEC	**(15)** 2 2 3 2 2 2 2	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** Whitman Michael, E. and Mattord Herbert, J. 2011. **Principles of Information Security**. 4th Edition. USA: Course Technology

DATA STRUCTURES WITH C

Credits: 4 **Semester: II**

Course Code: BS24204 **No of Lecture Hours: 75**

Course Objective:

- To focus on different methods of sorting, searching, storing data and understanding time and storage efficiency

Course Outcome:

CO1: Choose appropriate data structures to represent data items in real world problems
CO2: Illustrate non-linear data structures like linked list
CO3: Organize the data using sorting various linear data structures and determine time complexity
CO4: Construct data with nonlinear data structure using trees.
CO5: Explain the concept of graphs and b trees

Course Content	Hours Allotted	Pedagogy
Module I: Title: • Introduction to Data Structures • Stacks- Definition and various operations performed on stacks • Queues - Definition and various operations performed on queues Stack applications • Notations - Prefix, Postfix, Infix • Conversions -Infix to Postfix, Infix to Prefix	**(15)** 2 4 4 2 3	Power point presentations / Lectures
Module II: Title: • Data Representation, Concept of linked list • Advantages of Linked List, Types of Linked List • Linear Linked list - Various operations performed on singly linked list • Doubly Linked List - Various operations performed on singly linked list • Circular Linked List • Applications for Linked Lists	**(15)** 2 2 3 4 2 2	Case Studies / Review of research articles
Module III: Title: • Trees Definition and properties • Binary Trees-Definition and Representation of Binary trees • Operations: insertion, deletion, search • Tree traversal techniques- in order. pre order. post order • AVL trees Definition and representation of AVL • Trees Operations on AVL trees- insertion, deletion	**(15)** 2 3 3 2 3 2	Assignments

Module IV: Title: • Sorting methods • Bubble sort • Insertion sort • Selection sort • Merge sort • Quick sort • Searching methods a. Linear Search b. Binary Search	**(15)** 2 2 2 2 2 3 2	Lectures
Module V: Title: • Graphs Terminology & Representations, Definition and representation of graph • Graph Traversal -BFS, DFS • B-Trees, Definition and representation of B-Trees • Operations on B- Tree-insertion, deletion, search • File Structures - Physical Storage Media File Organization • Sequential Files, Indexing and Hashing, Primary indices, Secondary indices • Indexing and Hashing Comparisons	**(15)** 3 2 2 2 2 2 2	Assignments / Lectures

Learning Resources	
1.	**ESSENTIAL READING** 1. Kanetkar, Yashvanth,2020, 14th Edition, Data Structures through C India: BPB Publications. 2. Tanenbaum, A.M. Langsam, Y. Augenstein, M.J.Data Structures Using C. New Delhi: Pearson Education
2.	**SUGGESTED READINGS:** 1. Balagurusamy, E. C Programming& Data Structures. Tata McGraw-Hill. 2. KrishnaMoorthy.R. IndiraniKumaravel, G. 2008.Data Structures Using C. Tata Mc Graw Hill Publishing Company Lid

OPERATING SYSTEM LAB

Credits: 1 **Semester: II**

Subject Code: CSIT25202 **No. of Practical Hours: 30**

Objectives:

- To understand the commands and programming constructs of Shell Programming.
- To understand various algorithms related to CPU scheduling and memory management.

Outcome:

Students will be able to identify UNIX/Linux utilities and implement shell scripts to perform more complex tasks.

1. Introduction to Vi Editor, File and Directory related Commands.
2. Miscellaneous Commands
3. Arithmetic in Shell Scripts
4. Sample programs using Shell Script
5. Decision making in Shell Script
6. Loop control structures in Shell Script.
7. Implementation of UNIX System calls
8. Implementation of CPU Scheduling algorithms
9. Implementations of memory management algorithms

PRINCIPLES OF INFORMATION SECURITY LAB

Credits : 1 **Semester: II**

Course Code : CSIT25203 **No. of Practical Hours: 30**

Objective: To analyze the security tools for protecting the information

Outcome: Students will be able to work with computer security tools and simulate network architecture.

No of Hours **TOPIC**

1. Installation of Operating System Using VMware.
2. Exploring Internet Options for a Browser, Examination and configuring the Contents of Security and Privacy Tabs Using Nmap

- Find open ports on a System
- Find the machines which are active
- Find the version of Remote OS on other systems
- Find the version of Software installed on another system.

3. Program to implement Virus.
4. Demonstrate Intrusion Detection System
5. Exploring Wireless Security Tools (Air snare)
6. Implementation of Stenography –Hiding a Text File within a Image File using Win Rar
7. Digital Signing a word document, PDF document and Email
8. Creating Public Key, Private Key and Digital Certificate
9. Create SSL Certificate Using XCA Software
10. Demonstration of Hash Function using Cry tool
11. Study of Hardware and Software Firewalls and Case Study on Man-In-Middle Phishing and pharming Attacks

Data Structures with C -Lab

Credits : 1 **Semester: II**

Subject Code : CSIT25204 **No. of Lecture hours:30**

Objectives: To implement data structures for problem solving and analyze the searching algorithms in the context of specific engineering problems

Outcomes:
1. Choose the appropriate data structure for problem solving.
2. Code, debug and demonstrate the working nature of different types of data structures and their applications.
3. Analyze and compare various linear and non-linear data structure.
4. Document the results and operations of various Data Structure.

TOPIC

1. Program to find transpose of a sparse matrix

2.Program to find the sum of two 2-D arrays of order 2X2

3.Program to find the transpose of a matrix

4. Program to find the upper triangle of an array

5. Program to find the trace of a 2-D array

6. Program to find the lower triangle of an array

7.Program to find the addition of two sparse matrix

8. Program to perform linear search

9. Program to implement binary search

10.Program to implement bubble sort

11. Program to implement insertion sort

12.Program to implement selection sort

13 . Program to implement quick sort

14 . Program to implement merge sort on 2 sorted lists

15 .Program to implement stack operations using array

16 .Program to implement queue operations using array

17 .Program to implement stack operations using linked list

18. Program to implement queue operations using linked list

19 .Program to convert infix expression to postfix

20 .Program to evaluate a postfix expression

21 .Program to create a linked list

22 .Program to concatenate two lists

23 .Programs to perform insertion and deletion operations on the linked list

24 .Program to copy a list into another list

25 .Program to split a list into two linked lists

26 .Program to search for a node in the list.

27 .Program to find the number of elements in the list

28 .Program to illustrate tree traversal techniques.

29 .Program to implement graph traversals

Year-wise and Semester-Wise Distribution of Courses
Department of B.Sc. Computer Science and Information Technology
Second Year First Semester
Academic Year 2025-26 of 2024 – 2027 Batch (CBCS)

Sl. No.	Part	Course Code	Title of the Course	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	I	ES23301	Environmental Studies and Gender Sensitization (AECC-5)	3	3	40	60	100	3
2	II	G20CSIT 1T	PC Hardware, and Software Installation (GE-2) (1D)	2	3	40	60	100	2
3	II	CSIT23301	Principles of Information Security (SEC-2)	4	3	40	60	100	4
4	II	BS18335	Discrete Mathematics (Core-7)	5	3	40	60	100	4
5	II	CSIT23302	Computer Networks (Core-8)	4	3	40	60	100	4
6	II	BS18336	Java Programming (Core-9)	4	3	40	60	100	4
PRACTICALS									
7	II	G20CSIT1P	PC Hardware and Software Installation – Lab (GE-2) (1D)	2	3	40	60	100	1
8	II	CSIT23303	Principles of Information Security-Lab (SEC-2)	2	3	40	60	100	1
9	II	CSIT23304	Computer Networks- Lab (Core-8)	2	3	40	60	100	1
10	II	BS18337	Java Programming -Lab (Core-9)	2	3	40	60	100	1
Total				**30**	**-**	440	600	1040	**25**
11	II	CSIT18305	Internship*	-	-	40	-	40	3 (NON – CGPA)

***Generic Elective (GE)**
***Ability Enhancement Compulsory Course (AECC)**
***Skill Enhanced Compulsory Course (SECC)**
***Inter-Disciplinary (ID)**
*** Internship**

ENVIRONMENTAL STUDIES & GENDER SENSITIZATION

Credits: 3 **Semester: III**

Course Code: ES23301 **No of Lecture Hours: 45**

Course Objective:

- To understand the importance of ecological balance for Sustainable Development
- To understand the impacts of developmental activities and mitigation measures
- To understand the environmental policies and regulations.
- To develop students' sensibility with regard to issues of gender in contemporary India
- To provide a perspective on the socialization of men and women
- To expose the students to debate on the politics and economic works and on gender violence

Course Outcome:

CO1: Understand the importance of Environmental education, conservation of natural resources & understand the importance of ecosystems and biodiversity.

CO2: Understand the pollution problems and apply the environmental science knowledge on solid waste management, disaster management.

CO3: Apply the environmental science knowledge to improve the resources and evaluate and understand the sustainable environmental conditions and control methods.

CO4: Identify the interactions and intersections of identities (e.g., gender, race, ethnicity, class, sexuality, and so on) and assess the ways in which they contribute to instances of privilege and power dynamics across cultures, space, and time and their problems.

CO5: Understand the gender problems and ways of addressing them, including interactions across local to global scales in communities and overcome inequalities with legislations

Course Content	Hours Allotted	Pedagogy
Module I: **Title: Natural Resources, Ecosystems & Biodiversity**	**(9)**	Power point presentations / Lectures
• Definition, Scope and importance of environmental studies. Need for public awareness.	2	
• Renewable & Non-Renewable resources, Brief account on Forests, Water, Minerals and Energy (Solar, Wind, and Geo-thermal & Bioenergy).	2	

• Definition of Ecosystem, Structure and functions—food chains, food webs, ecological pyramids, producers, consumers and decomposers. • Energy flow and example ecosystems--- Forest, Desert, Aquatic ecosystems. • Definition of Biodiversity, types (Genetic, Species, Ecosystem), India- mega diversity Nation. • Hotspots, Threats to biodiversity, Conservation of biodiversity (In-Situ and Ex-Situ).	2 1 1 1	
Module II: **Title: ENVIRONMENTAL POLLUTION** • Definition of Environmental pollution • Brief account of causes, effects, prevention and control measures of ➢ Air pollution ➢ Water Pollution ➢ Soil pollution ➢ Noise pollution ➢ Marine Pollution • Solid Waste Management: Causes, Effects & Control measures of urban and industrial wastes • Disaster Management: floods, Earthquakes, and Cyclones.	**(9)** 2 3 2 2	Case Studies / Review of research articles
Module III: **Title: Social Issues and Environment** • Rain - Water Harvesting, Water-shed Management, and From Unsustainable to Sustainable Development. • Global Warming, Ozone depletion, and Acid rains • Environmental Legislation: Air Act, Water Act, Environmental Protection Act, Forest Act, Wildlife Act. • Environmental & Human Health---- HIV/AIDS • Welfare Programs---- Family, Women & Child Welfare, Population Explosion • Role of Information Technology in Environmental Studies.	**(9)** 2 1 2 1 2 1	Assignments
Module IV: **Title: Gender Studies** • Why should we study gender issues? • Socialization- Making women and making men • Being together as equals-Through the lens of gender • Missing women: Gender selection and its consequences • Health issues of Women	**(9)** 2 2 2 2 1	Lectures
Module V: **Title: Gender & Labour -Gender Violence & Law** • Housework: The invisible labour- my mother doesn't work "share the load"	**(9)** 2	Assignments / Lectures

• Sexual harassment – say no eve teasing – the caste-based violence –Nirbhaya Act	2	
• Domestic violence - Is home a safe place? - Blaming the victim. -Domestic violence Act	2	
• Forums of justice-Hindu Inheritance Act (2005)	3	

Learning Resources	
1.	Textbook: • A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu. 201. **Towards a World of Equals: A Bilingual Text on Gender**. Hyderabad: Telugu Akademi. • Rajagopalan R. 2015. **Environmental Studies-from Crisis to Cure.** Third Edition. Chennai: Oxford University Press. • Dr D K Asthana and Dr Meera Asthana. 2014. **A Text Book of Environmental Studies** Revised Edition. New Delhi: S. Chand & Company. • Anubha Kaushik and C.P. Kaushik Published. 2016. **Perspectives in Environmental Studies.** Fifth Edition. New Delhi: New Age International.
2.	Reference books: • Sen Amartya More **Than One Million Women Are Missing.** New York Review of Books 37.20 (20 December 1990). Print. **We Were Making History...Life Stories of Women in the Telangana People's Struggle**. New Delhi: Kali for Women. 1998. • Tripti Lahiri. **By the Numbers: Where Indian Women Work. Women's Studies Journal .** *(*14 November 2012). Available online at: <http://blogs.wsj.com/ India real time/2012/11/14/by – the numbers-where-Indian-women-work/> • K. Satyanarayana and Susie Tharu. Ed. **Steel Nibs Are Sprouting : New Dalit Writing From South India, Dossier 2: Telugu and Kanada** Code=3732. • Vimala. **Vantillu (The Kitchen)". Women Writing in India: 600 Bc to the Present. Volume II.** The 20th Century. Ed. Suise Tharu and K.Laltitha. Delhi: Oxford University Press, 1995.599-601. • Shatrughna, Veena. **Women's Work and its Impact on Child Health and Nutrition.** Hyderabad: National Institute of Nutrition, Indian Council of Medical Research .1993.

PC HARDWARE AND SOFTWARE INSTALLATION

(GE Inter-Disciplinary)

Credits: 2 **Semester: III**

Course Code: G20CSIT 1T **No of Lecture Hours: 30**

Course Objective:

- To learn the fundamentals of personal computing and basic networking concepts.
- To learn basics of hardware, operating systems, and application software.

Course Outcome:

CO1: Identify the basic components of computers

CO2: Differentiate between internal and external connectors

CO3: Identify and troubleshoot the power supply of computer

CO4: Choose RAM and Hard disk drives for a computer

CO5: Develop skills to Assembly and Disassembly a system

Course Content	Hours Allotted	Pedagogy
Module I: **Title:**	**(6)**	Power point presentations / Lectures
• Introduction to Computers, History, classification, Block diagram of Computer	2	
• Hardware and Software, Input and Output Devices	1	
• Data and information and Computer memory Units	1	
• Computer Ports and Characteristics of Ports.	2	
Module II: **Title:**	**(6)**	Case Studies / Review of research articles
• System Unit: Motherboard Form Factor (ATX, BTX)	1	
• Internal Connectors: Power Supply Connectors, PCI, ISA,	1	
• IDE, AGP, PCI Express, SATA, DIMM.		
• External Connectors: Serial Port, Parallel Port, Game Port, USB, RJ-45, VGA or Monitor, PS/2, Din, Sound Card	1	
• Motherboard ROM BIOS, Upgrading BIOS	3	

Module III: **Title:** • Chipsets: Northbridge and Southbridge. • Power Supply: Introduction of SMPS • troubleshooting of SMPS • Memory: RAM and ROM; Types of RAM: DRAM, SDRAM, DDR, DDR2 and DDR3	**(6)** 1 2 1 2	Assignments
Module IV: **Title:** • Storage Devices: HDD vs SDD • Types of hard disk drives and its controllers: IDE, SATA, USB, SCSI • Working of Hard Disk Drive and file systems • Recovery of Data from storage device	**(6)** 1 1 2 2	Lectures
Module V: **Title:** • System Assembly and Disassembly • System startup, installing OS, Troubleshooting New installations • PC Diagnostics-The POST, Hardware BOOT Process	**(6)** 2 2 2	Assignments / Lectures

Learning Resources	
1.	Textbook: • Mueller Scott, M. 2015. **Upgrading and Repairing PCs**. 22nd Edition. New Delhi Pearson Education

PRINCIPLES OF INFORMATION SECURITY

Credits: 4 **Semester: III**

Course Code: CSIT23301 **No of Lecture Hours: 60**

Course Objective:

- To compile, analyze, and assess the applicability of best practices in addressing information
- To address the issues relevant to the cyber security community

Course Outcome:

CO1: **Explain** concepts of confidentiality, availability and integrity (CIA) in context of Information security

CO2: **Identify** the risk, assess and risk control strategies.

CO3: **Demonstrate** expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention

CO4: **Analyse** systems, tools, methods, and techniques for securing digital information within an organisation

CO5: **Develop** encryption and decryption techniques.

Course Content	Hours Allotted	Pedagogy
Module I:		Power point presentations / Lectures
Title: INTRODUCTION OF INFORMATION SECURITY	**(12)**	
• Introduction to Security, Critical Characteristics of Information	3	
• NSTISSC Security Model, Components of Information Security, Balancing Information Security and Access	3	
• Approaches to Information Security Implementation, System Development Life Cycle	3	
• Security System Development Life Cycle, Information Security: Art of Science	3	
Module II:		Case Studies / Review of research articles
Title: THE NEED FOR SECURITY	**(12)**	
• Important functions of Information Security	2	
• Threats and category of Threats	4	
• Attacks and Types of Attacks	4	

• Secure Software development	2	
Module III: **Title: SECURITY TECHNOLOGY: FIREWALLS AND VPNS**	**(12)**	Assignments
• Firewalls: Processing modes, categorizations	2	
• Firewall Architecture, Choosing a Firewall	2	
• Configuring and Managing a Firewall	2	
• Firewall Rules	2	
• Protecting Remote Connections: Securing Authentication with Kerberos	2	
• VPN: Transport and Tunnel Mode	2	
Module IV: **Title: SECURITY TECHNOLOGIES: INTRUSION DETECTION AND OTHER SECURITY TOOLS**	**(12)**	Lectures
• IDPS: terminology, types of IDPS	3	
• IDPS Detection Methods, IDPS Response Behavior	2	
• Strengths and Limitations of IDPS	1	
• Honeypots, Honeynets and Padded Cell Systems	1	
• Port Scanners, Firewall Analysis Tools	1	
• Operating System Detection Tools, Vulnerability Scanners	2	
• Packet Sniffers, Wireless Security Tools	2	
Module V: **Title: CRYPTOGRAPHY**	**(12)**	Assignments / Lectures
• Terminology, Cryptographic Tools, PKI,	2	
• Digital Signature, Digital Certificate and Steganography	1	
• Protocol for Secure Communication: Securing the Internet with SSL	1	
• Securing Email with S/MIME, PGP	2	
• Securing web Transactions SET	2	
• Securing wireless Network with WEP and WPA	2	
• Securing TCP/IP with IPSEC	2	

Learning Resources	
1.	Textbook: • . Whitman Michael, E. and Mattord Herbert, J. 2011. **Principles of Information Security**. 4th Edition. USA: Course Technology.

DISCRETE MATHEMATICS

Credits: 4 **Semester: III**

Course Code: BS18335 **No of Lecture Hours: 75**

Course Objective:

- To introduce lattices, Graph theory and to familiarize with the basic concepts of Number theory.

Course Outcome:

CO1: Develop understanding of Logic Sets and Functions

CO2: **Evaluate** and apply the fundamental concepts in graph theory

CO3: **Develop** an understanding of how graph and tree concepts are used to solve problems arising in computer science.

CO4: Express the concepts and results of Number Theory.

CO5: **Identify** methods and techniques used in number theory.

Course Content	Hours Allotted	Pedagogy
Module I:		
Title: LATTICES	**(15)**	
• Relations and ordering	3	Power point presentations / Lectures
• Partial order relations - Partially ordered sets	3	
• Hasse diagrams	3	
• Lattices - Properties of lattices	3	
• Types of Lattices	3	
Module II:		
Title: GRAPH THEORY – I	**(15)**	
• Definition of a graph, Degree of vertex	3	Case Studies / Review of research articles
• First theorem of graph theory Paths and connection	3	
• Isomorphism of graphs	3	
• Some special simple graphs	6	
Module III:		
Title: GRAPH THEORY – II	**(15)**	
• Trees and their properties	9	Assignments
• Binary trees, Binary search trees, Spanning trees, Kruskal's Algorithm, Prim's Algorithm, Planar graphs,	6	

Euler's formula		
Module IV: **Title: GRAPH THEORY-III** • Euler graphs • Hamiltonian graphs- Grinberg theorem • Chromatic numbers	**(15)** 5 5 5	Lectures
Module V: **Title: ELEMENTS OF NUMBER THEORY** • Divisibility- Division algorithm • Euclid' algorithm • Properties of G.C. D • Primes – Fundamental theorem of Arithmetic. • Congruence's – Properties • Fermat's theorem and its Applications • Wilson's theorem and its Applications	**(15)** 1 2 2 2 2 3 3	Assignments / Lectures

Learning Resources	
1.	Textbook: • Tremblay Jean, P. and Manohar, R. 2007. **Discrete Mathematical Structures with Applications to Computer Science.** New Delhi: McGraw-Hill. (For Unit I) • Mott Joe, L. Kandel Abraham. And Baker Theodore, P. 1999. Discrete **Mathematics for Computer Scientists and Mathematicians.** 2nd Edition. New Delhi: PHI (For Units II, III and IV) • Burton David, M. 2010. Elementary **Number Theory**. 7th Edition. New Delhi: McGraw-Hill. (For Unit V).

COMPUTER NETWORKS

Credits: 4 **Semester: III**

Course Code: CSIT23302 **No of Lecture Hours: 60**

Course Objective:

- To get familiarized with fundamental concepts of computer networks.
- To gain expertise in various layers of the TCP/IP model.

Course Outcome:

CO1: **Identify** basic computer network topologies and protocols and explain Data Communication System components

CO2: **Classify** different error detecting techniques.

CO3: C**onstruct** subnetting and routing mechanisms.

CO4: **Sketch** the routing protocols and analyze how to assign the IP addresses for the given network

CO5: **Develop** network design and implementation

Course Content	Hours Allotted	Pedagogy
Module I: **Title: Introduction**	**(12)**	Power point presentations / Lectures
• Introduction: Data Communications, networks, Protocols and Standards	2	
• TCP/IP Protocol suite	2	
• Analog and Digital, Transmission impairments	2	
• Transmission Media-Guided media, Connecting Devices	1	
• Digital Transmission- digital-to-digital conversion	2	
• Multiplexing: Frequency-division, Wavelength and Time Division	3	
Module II: **Title: DATA LINK LAYER**	**(12)**	Case Studies / Review of research articles
• Error detection and correction-Parity, check sum, CRC, Hamming code	3	
• Data Link Control: Framing, flow and error control	3	
• Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Piggybacking	3	

• HDLC, Random Access- ALOHA, CSMA, CSMA/CD, CSMA/CA • Wired LANs- Ethernet	2 1	
Module III: **Title: NETWORK LAYER** • IP address space- Introduction • Classful and Classless addressing, subnetting and superwetting • IPv4- datagram, Fragmentation, checksum, options • Internet Control Protocols- ICMP, IGMP, ARP and RARP • Delivery, Forwarding, Unicast routing protocols- RIP, OSPF, BGP	**(12)** 3 2 2 3 2	Assignments
Module IV: **Title: TRANSPORT LAYER** • Process-to-Process Delivery, UDP-well known ports, user datagram, checksum • UDP Operation, use of UDP • TCP- process to process communication, Numbering bytes, TCP services • Flow control- silly window syndrome, Error Control • TCP connection, State transition diagram, Congestion control, Timers, Options	**(12)** 2 3 3 2 2	Lectures
Module V: **Title: APPLICATION LAYER** • DNS- Namespace, domain name space, distribution of name space • DNS in internet, resolution, DNS messages, types of records • TELNET, E-mail- architecture, message transfer agent: SMTP • Message Access Agent: POP, FTP • WWW and HTTP- architecture, web documents, HTTP	**(12)** 2 3 3 2 2	Assignments / Lectures

Learning Resources	
1.	Textbook: • Forouzan, Beharouz A. 2011. **Data Communications and Networking**. 3rd Edition. New Delhi: Tata Mc Graw Hill. (UNIT-I, II) • Forouzan, Beharouz A. 2005. **TCP/IP Protocol Suite**. 3rd Edition. New Delhi: Tata Mc Graw Hill. (UNIT-III-V)
2.	Reference books: • Tanenbaum, Andrew S. 2008. **Computer Networks**. 4th Edition. New Delhi: Pearson Education.

JAVA PROGRAMMING

Credits: 4 **Semester: III**

Course Code: BS18336 **No of Lecture Hours: 60**

Course Objective:

- To help the students understand the fundamentals of object-oriented programming.
- To emphasize learning important principles of software development and provide practice in developing small-scale programs.

Course Outcome:

CO1: **Differentiate** between object-oriented programming and procedure-oriented programming

CO2: **Apply** object-oriented programming features for solving a given problem.

CO3: **Select** an appropriate exception handling depending on application.

CO4: **Design** file operations using java standard library

CO5: **Develop** interactive programs using applet and swing

Course Content	Hours Allotted	Pedagogy
Module I:		Power point presentations / Lectures
Title: Object-Oriented Programming	**(12)**	
• Introduction, Object Oriented Paradigm	1	
• Basic concepts	1	
• Benefits of OOP, Applications of OOP	1	
• Introduction to Java, Features of Java	1	
• Simple Java Program, Java Program Structure	1	
• Java Tokens, Java Statements, JVM	1	
• Variables, Data types, Operators and Control statements	1	
• Java Program structure, Simple Java program	1	
• Classes, Objects and Methods**:** Defining Class, Adding Variables, Methods	2	
• Creating Objects, Accessing Class Members	1	

• Constructors, finalize () method	1	
Module II: **Title:**	**(12)**	Case Studies / Review of research articles
• Method Overloading, Static Members, Nesting of Method	1	
• Inheritance, Overriding Methods, Final Variables and Methods, Final Classes	2	
• Abstract Methods and Classes, Visibility Control	1	
• Arrays, Strings and Vectors, Wrapper classes	1	
• **Interfaces:** Defining Interfaces, Extending and Implementing Interfaces	2	
• Accessing Interface variables	1	
• **Packages:** Java API Packages, Using system Packages	1	
• Naming Conventions, Creating Packages	1	
• Accessing a Package, using a Package, Adding a Class to a Package	2	
Module III: **Title: Exception Handling**	**(12)**	Assignments
• Types of Errors, Exceptions	1	
• Uncaught Exceptions, Using try and catch	1	
• Multiple Catch Statements, Nested try statements, throw, throws and finally	2	
• Java's Built in Exceptions, User Defined Exceptions	1	
• Multithreaded Programming: Creating Threads, Extending the Thread Class, Stopping and Blocking a Thread	3	
• Life Cycle of a Thread	1	
• Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization	3	
Module IV: **Title: Input/output Files**	**(12)**	Lectures
• Introduction, Concept of Streams, Stream Classes, Byte	2	

Stream Classes • Character Stream Classes, Using the File Class, Input-Output Exception • Creation of Files, Bytes, Handling Primitive Data Types • Random Access Files, Simple Input/Output • Applets: Applet Class, Basics, Applet vs Application, Life Cycle • Applet Tag, Passing Parameters, A Simple Banner Applet	2 2 2 2 2	
Module V: **Title:** • Event and Event Handling: Sources of Events • Event Classes: Action Event, Mouse Event, Window Event, • Item Event, Key Event • Event Listeners, Action listener, Mouse Listener, Mouse Motion Window Listener, Key Listener, Handling Events. • Swing Controls: Label and ImageIcon, Button, JRadioButton, JCheckbox, JTable, JList, JToggleButton • JTree, JCombobox, JTextField, JOptionPane	**(12)** 1 2 3 3 3	Assignments / Lectures

Learning Resources	
1.	**Textbook:** • Schildt Herbert. 2002. **Java 2: The Complete Reference.** 5th Edition. New Delhi: McGraw-Hill.
2.	**Reference books:** • Deitel Paul, J and Deitel Harvey, M. 2012. **Java: How to Program**. 6th Edition. New Delhi: PHI. • Gaddis Tony. 2015. **Starting Out with Java**. 6th Edition. New Delhi: Pearson

PC HARDWARE AND SOFTWARE INSTALLATION LAB

(GE Inter-Disciplinary)

Credits: 1 **Semester: III**

Course Code: G20CSIT1P **No of Lecture Hours: 30**

Course Objective:

- To identify various components of PC.
- To learn installation of windows and Linux operating system.
- To learn the installation and configuration of networking

Course Outcome:

- Students will be able to assemble the PC and install operating systems and application software.

S. NO	Course Content	Hours Allotted
01	Processor Types, Expansion Buses, connectors and cables	**2**
02	Identification of Mother Boards, Chipsets, Memory and Types.	**2**
03	Storage Devices: Hard Disk, Optical Storage and USB	**2**
04	Exploring CMOS BIOS Setup utility.	**2**
05	Identify and Assembling of PC.	**2**
06	Installation of Windows 7.0 Operating System.	**2**
07	Installation of Linux Operating System	**2**
08	Recovery of data from storage device	**2**
09	Study of different types of network cables	**2**
10	practically implement the cross-wired cable and straight through cable using clamping tool	**2**
11	Study of Network Devices in Detail	**2**
12	Study of Network IP	**2**
13	Connect the computer in Local Area Network	**2**
14	Study of basic network command and network configuration commands	**2**
15	Study of latest devices in Market	**2**

PRINCIPLES OF INFORMATION SECURITY LAB

Credits: 1 **Semester: III**

Course Code: CSIT23303 **No of Lecture Hours: 30**

Course Objective:

- To analyze the security tools for protecting the information.

Course Outcome:

- Students will be able to work with computer security tools and simulate network architecture

S. No.	Course Content	Hours Allotted
1.	Installation of Operating System Using VMware.	2
2.	Exploring Internet Options for a Browser, Examination and configuring the	10
3.	Find open ports on a System	
4.	Find the machines which are active	
5.	Find the version of Remote OS on other systems	
6.	Find the version of Software installed on another system.	
7.	Program to implement Virus.	2
8.	Demonstrate Intrusion Detection System	2
9.	Exploring Wireless Security Tools (Air snare)	2
10.	Implementation of Stenography –Hiding a Text File within a Image File using WinRar	2
11.	Digital Signing a word document, PDF document and Email	2
12.	Creating Public Key, Private Key and Digital Certificate	2
13.	Create SSL Certificate Using XCA Software	2
14.	Demonstration of Hash Function using Cry tool	2
15.	Study of Hardware and Software Firewalls and Case Study on Man-In-Middle Phishing and pharming Attacks	2

COMPUTER NETWORKS LAB

Credits: 1 **Semester: III**

Course Code: CSIT23304 **No of Lecture Hours: 30**

Course Objective:

- Hands-On training regarding the design, troubleshooting and evaluation of computer networks

Course Outcome:

- Demonstrate basic switching concepts, VLAN, routing, dynamic and static routing protocols using Cisco packet tracer software (Freeware)

S. No.	Course Content	Hours Allotted
1.	Study of different types of Network cables and practically implement cross-wired Cable and straight through cable using crimping tool	**4**
2.	Study the Network Devices in Detail	**3**
3.	Study of Network IP	**3**
4.	Connect Computers in LAN	**2**
5.	Study of Basic Networking Commands	**2**
6.	Configure a Network Topology using Packet Tracer	**2**
7.	Performing an Initial Switch Configuration	**2**
8.	Performing an Initial Router Configuration	**2**
9.	Interpreting Ping and Traceroute Output	**2**
10.	Observing Static and Dynamic Routing	**2**
11.	Configure a Network Using Distance Vector Routing Protocol	**2**
12.	Configure a Network Using Link State Vector Routing Protocol	**2**

JAVA PROGRAMMING LAB

Credits: 1 **Semester: III**

Course Code: BS18337 **No of Lecture Hours: 30**

Course Objective:

- To strengthen problem solving ability by applying the characteristics of an object-oriented approach in Java.
- To build software for real world applications.
- To implement frontend of an application

Course Outcome:

- Students will be able to develop applications using object-oriented concepts of varying complexities.

Course Content	Hours Allotted
1. Program to print student details by class concept.	**2**
2. Program to add two numbers using method overloading.	**1**
3. Program to demonstrate application of constructors.	**1**
4. Program to implement single inheritance.	**1**
5. Program to implement method overriding.	**1**
6. Program to demonstrate abstract class.	**1**
7. Program to implement packages.	**1**
8. Program to implement interfaces.	**1**
9. Program to illustrate interface extending another interface.	**1**
10. Program to implement try and catch statements	**1**
11. Program to illustrate multiple catch blocks	**1**
12. Program to implement nesting of try block.	**1**
13. Program to implement finally statement.	**1**
14. Program to implement throw in exception handling.	**1**
15. Program to implement throw using user defined exception.	**1**
16. Program to implement a simple multithreading program.	**1**
17. Program to implement runnable interface.	**1**
18. Program to implement thread priority.	**1**
19. Program to read and write characters.	
20. Program to count no. of characters, words and lines in a file.	**1**
21. Program to read and write primitive data.	**1**

22. Program to implement Random Access files.	**1**
23. Program for animation in applet.	**1**
24. Program for reading parameter through applet.	**1**
25. Develop an Applet to compute factorial value when the button "Compute" is clicked.	**1**
26. Develop an Applet to computer Arithmetic operations when the button is clicked.	**1**
27. Program handling mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).	**1**
28. An applet program on (i) JCombobox, (ii) JToggleButton (iii) JList (iv) JTabbedpane	**1**
29. An applet program for validating user credentials.	**1**

INTERNSHIP

Credits: 3 **Semester: III**

Course Code: CSIT18305 **No of Lecture Hours: 15**

Second year students are required to take up an internship / On Job Training in the domain of Networking, System assembling and disassembling, PC Hardware Installation and Trouble Shooting, or Network Administration during summer for 4 weeks which carries a total of 40 marks evaluated internally.

The criteria for the Internal Evaluation of Internship work / On Job Training Work for 40 marks is as follows:

Course Content	Marks
• Attendance	**5**
• Internal Presentation (Presentation and Communication skills)	**10**
• Practical demonstration (Objectives, work submission, methodology, results, Practical relevance evaluated by the faculty)	**15**
• Report	**10**

Year-wise and Semester-Wise Distribution of Courses
Department of B.Sc. Computer Science and Information Technology
Second Year Second Semester
Academic Year 2025-26 of 2024 – 2027 Batch (CBCS)

Sl. No.	Part	Course Code	Title of the Course	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	BS23401	Probability and Statistics (GE-3) (DS)	4	3	40	60	100	4
2	II	CSIT23401	Ethical Hacking (SEC-3)	4	3	40	60	100	4
3	II	CSIT20402	Computer Organization (Core-10)	3	3	40	60	100	3
4	II	BS18430	Operating Systems (Core-11)	4	3	40	60	100	4
5	II	BS20404	Micro Processors & Micro Controllers (Core-12)	3	3	40	60	100	3
6	II	CSIT20403	Python Programming (Core-13)	3	3	40	60	100	3
PRACTICALS									
7	II	CSIT23404	Ethical Hacking-Lab (SEC-3)	2	3	40	60	100	1
8	II	BS18431	Unix Shell Programming - Lab (Core-11)	2	3	40	60	100	1
9	II	CSIT18405	Micro Processors and Applications- Lab (Core-12)	2	3	40	60	100	1
10	II	CSIT20406	Python Programming –Lab (Core-13)	2	3	40	60	100	1
Total				**29**	**-**	400	600	1000	**25**

*** Generic Elective (GE)**
***Skill Enhancement Course (SEC)**
***Discipline-Specific (DS)**

PROBABILITY & STATISTICS

Credits: 4 **Semester: IV**

Course Code: BS23401 **No of Lecture Hours: 60**

Course Objective:

- To teach concepts and applications of Statistics in real life situations**.**

Course Outcome:

CO1: Calculate the mean, median, and mode of a set of data and **identify** the importance of measures of dispersion.

CO2: Use discrete and continuous probability distributions, including requirements and making decisions.

CO3: Employee the principles of linear regression and correlation, including least square method, predicting a particular value of Y for a given value of X and significance of the correlation coefficient.

CO4: **Knowledge** about formulating and testing a hypothesis, using critical values to draw conclusions and determining probability of making errors in hypothesis tests, and about large sample tests.

CO5: Understand and **analyse** various methods of small sample tests.

NOTE: APPLICATION ORIENTED ONLY. NO MATHEMATICAL DERIVATIONS

Course Content	Hours Allotted	Pedagogy
Module I: **Title:** • Various measures of Central Tendency – Mean, Median & Mode • Definitions, Merits, Demerit, Problems (grouped and ungrouped data) • Various measures of dispersion - Standard Deviation and Variance • Definitions, Merits, Demerit, Problems (grouped and ungrouped data)	**(12)** 4 4	Power point presentations / Lectures

• Probability: Basic terminology, Addition theorem problems, Multiplication theorem problems, Bayes theorem problems (Derivations for theorems not included)	4	
Module II: **Title:** Random Variable: • Discrete Random variable & Continuous Random variable • Probability Mass & Density functions. Mathematical Expectation: • Mathematical Exception, Addition Theorem of expectation, Multiplication theorem of expectation. (Excluding Derivations – Problems only) Theoretical Distributions: • Discrete distributions: Binomial distribution, fitting of binomial distribution • Poison distributions, fitting of poisson distribution • Normal Distribution: Chief characteristics of the normal distribution, area of a property, Importance and fitting of a normal distribution. (Excluding derivations – Applications only for all distributions mentioned above)	**(12)** 4 4 4	Case Studies / Review of research articles
Module III: **Title: Correlation and Regression:** • Simple correlations (definitions and types) • Karl Pearson coefficient of correlation • Rank correlation • Regression and regression lines (Problems only)	**(12)** 3 3 3 3	Assignments
Module IV: **Title:** **Testing of Hypothesis:** • Sampling distribution, the null hypothesis and type I and II errors • Critical region and level of significance. **Tests of significance for large samples:** • Test of single proportion • Test of significance of difference of proportions • Test of significance for single mean and difference of means • Test of significance for difference of standard deviations	**(12)** 6 6	Lectures
Module V: **Title:** **Small Sample Tests** • **Chi – Square test:** ➢ Population Variance	**(12)** 4	Assignments / Lectures

➢ Goodness of fit ➢ Independence of attributes (Problems only) • **T- test:** ➢ Single Mean ➢ Difference means and paired t-test (Problems only) • **F-test:** ➢ Test of significance based on equality of two variances (Problems only)	4 4	

Learning Resources	
1.	Textbook: • Gupta, S. C. (2011). ***Fundamentals of statistics*** (pp. 18-1). New Delhi, India: Himalaya publishing house. • Gupta, S. P. (1978). **Statistical Methods** 1978. 46th Edition.
2.	Reference books: • Deovre, J. (1987). **Probability and statistics for engineering and science**. *Brooks/Cole, Belmont, CA.* • Richard A. Johnson, Miller, Freund. **Probability & Statistics for Engineers**. PHI Publications

Ethical Hacking

Credits: 4 **Semester: IV**

Course Code: CSIT23401 **No of Lecture Hours: 60**

Course Objective:

- To get familiar with the essential terms in Hacking and Various phases of attacks
- To provide the details on Law and Punishment for Hacking.
- To explain the maintenance of access gained through hacking and the techniques used to avoid the traces of attacks in order to escape from the legal Punishment by a malicious hacker

Course Outcome:

CO1: **Explain** essential terminology and phases of hacking

CO2: **Identify** different types of scanning methods

CO3: **Analyse** how to perform IP Spoofing

CO4: **Understand** Sniffing and Social Engineering

CO5: **Understanding** Session Hijacking and DDoS concepts

Course Content	Hours Allotted	Pedagogy
Module I: **Title:** • Information Security Overview • Information Security Threats and Attack Vectors • Hacking Concepts, Types, Scope and Phases • Information Security Laws and Standards • Footprinting Concepts, Methodology, Tools • Footprinting Countermeasures	**(12)** 2 2 2 2 2 2	Power point presentations / Lectures
Module II: **Title:** • Overview of Network Scanning • Understanding different techniques to check for Live Systems and open ports • Understanding Various Scanning Techniques • Understanding various IDS Evasion Techniques • Understanding Banner Grabbing	**(12)** 3 2 3 2 2	Case Studies / Review of research articles

Module III: **Title:** • Overview of Vulnerability Scanning • Using Proxies and Anonymizers for Attacks • Understanding IP Spoofing and Various Detection Techniques • Overview of Scanning Pen Testing • Overview of Sniffing Concepts • Understanding MAC Attacks, ARP Poisoning, MAC Spoofing Attacks	**(12)** 2 2 2 2 2 2	Assignments
Module IV: **Title:** • Sniffing Tools • Sniffing Countermeasures • Understanding various Techniques to Detect Sniffing • Overview of Social Engineering Concepts • Understanding various Social Engineering Techniques • Understanding Insider Threats	**(12)** 2 2 2 2 2 2	Lectures
Module V: **Title:** • Overview of DOS and DDOS and its techniques • DoS and DDoS attack tools • Understanding the Botnet Network • Understanding Session Hijacking Concepts • Application-level Session Hijacking • Network Level Session Hijacking	**(12)** 2 2 2 2 2 2	Assignments / Lectures

Learning Resources	
1.	Textbook: • Ethical Hacking and Countermeasure V9,by EC- Council. • Mc Clure, Stuart, Scambray, Joel and Kurtz, George. 2009. **Hacking Exposed.** 7th Edition.New Delhi: McGraw Hill.
2.	**Reference books:** • Engerbrestson, Patrick. 2011.Basics of Hacking and Penetration.Syngress • Walker, Matt.2012. Certified Ethical Hacker All-in-One.McGraw Hill.

COMPUTER ORGANIZATION

Credits: 3 **Semester: IV**

Course Code: CSIT20402 **No of Lecture Hours: 45**

Course Objective:

- To have a thorough understanding of the basic structure and operation of registers and control memory.
- To discuss in detail the operation of the arithmetic unit including the algorithms and implementation of fixed-point and floating-point addition, subtraction and multiplication.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system

Course Outcome:

CO1: Demonstrate knowledge of register organization of a basic computer system

CO2: Explain machine language of a basic computer system.

CO3: Appraise in-depth understanding of control unit organization and micro programmed control.

CO4: Apply various algorithms to perform arithmetic operations and propose suitable hardware for them

CO5: Analyse and emphasize various communication media in the basic computer system using design of various memory structures.

Course Content	Hours Allotted	Pedagogy
Module I: **Title:**	**(9)**	Power point presentations / Lectures
• Instruction codes-direct and indirect mode	1	
• Computer registers, 16-bit common bus system	1	
• Computer instructions	1	
• Timing and Control, Instruction cycle	2	
• Input Output and interrupt	1	
• Memory reference instruction	1	

• Design of Basic Computer, Design of Accumulator Logic	2	
Module II: **Title:** • Programming Basic Computer: Machine Language, Assembly language • Assembler • Program loops • Programming Arithmetic and Logic Operations • Subroutines • Input Output programming	**(9)** 1 1 1 2 2 2	Case Studies / Review of research articles
Module III: **Title:** • Micro programmed control: control memory • Address sequencing • Computer hardware configuration • Micro instruction format • Design of control unit and micro-program sequencer	**(9)** 2 2 2 1 2	Assignments
Module IV: **Title:** • Pipeline and vector processing-parallel processing • Arithmetic pipeline, Instruction pipeline • Computer arithmetic-addition and subtraction • Floating point Arithmetic operation-consideration, configuration, addition and Subtraction • Multiplication algorithm- Booth algorithm, Array Multiplier • Division Algorithm- Hardware implementation, algorithm and divide overflow	**(9)** 2 1 1 1 3 1	Lectures
Module V: **Title:** • Peripheral devices • I/O interfaces, Modes of transfer • Direct Memory Access • I/O processor- CPU IOP Communication • Memory organization-memory hierarchy • Main memory-design of RAM and ROM chips • Auxiliary memory, Cache and Associative memory	**(9)** 1 1 1 1 1 2 2	Assignments / Lectures

Learning Resources	
1.	Textbook: • Mano Morris, M. 2007. **Computer System Architecture**. Prentice Hall of India.

OPERATING SYSTEMS

Credits: 4 **Semester: IV**

Course Code: BS18430 **No of Lecture Hours: 60**

Course Objective:

- To learn core ideas in operating systems, process management, memory protection, CPU scheduling, concurrent programming, deadlocks and File systems.

Course Outcome:

CO1: **Explain** functions, types and structures of operating system

CO2: **Analyze** various process management concepts including scheduling and synchronization

CO3: **Illustrate** the concepts of memory management and I/O system.

CO4: **Solve** issues related to file system interface.

CO5: **Choose** an appropriate Page replacement algorithm

Course Content	Hours Allotted	Pedagogy
Module I: **Title:** • Introduction -Define Operating System, mainframe system, desktop systems • Multiprocessor systems, distributed systems, clustered systems • Real-time systems, handheld systems • Operating system structures-system components • Operating system services, system calls • System programs, system structures, virtual machines	**(12)** 2 2 2 2 2 2	Power point presentations / Lectures
Module II: **Title:** • Process concept-process concept, process scheduling • Operation on processes, cooperating processes • Inter process communication • Process scheduling-basic concepts, scheduling criteria,	**(12)** 3 3 3 3	Case Studies / Review of research articles

scheduling algorithms		
Module III: **Title:** • Process synchronization-critical section problem • Semaphores, monitors • Deadlocks-deadlock characterization, methods for handling deadlocks • Deadlock prevention, Deadlock avoidance, Deadlock detection	**(12)** 3 3 3 3	Assignments
Module IV: **Title:** • File system-file concept, access methods • Directory structure, file system mounting, file system sharing. • File system implementation-file system structure, file system implementation. • Directory implementation, allocation methods, free space management	**(12)** 3 3 3 3	Lectures
Module V: **Title:** • Memory management-swapping, contiguous memory allocation • Fragmentation-internal and external fragmentation • Paging, segmentation, segmentation with paging. • Virtual memory management-demand paging • Page replacement algorithms, Thrashing and working set model.	**(12)** 2 2 3 2 3	Assignments / Lectures

Learning Resources	
1.	Textbook: • Silber Schatz Abraham, Galvin Peter, B. and Gagne Greg. 2006. **Operating System Concepts.** 6th Edition. India: Wiley.
2.	Reference books: • Tanenbaum Andrew, S. 2001. **Modern Operating Systems.** New Delhi: Pearson Education.

MICROPROCESSORS AND MICROCONTROLLERS

Credits: 3 **Semester: IV**

Course Code: BS20404 **No of Lecture Hours: 45**

Course Objective:

- To understand the microprocessor architecture with the help of 8086
- To study the concepts of interfacing techniques
- To study microprocessor programming applications
- To understand the differences between microprocessor and microcontroller
- To study the architecture of 8051 microcontroller

Course Outcome:

CO1: **Explain** the architecture of 8086 based micro computer

CO2: **Develop** the assembly language programs for 8086 based micro computer

CO3: **Develop** the interfacing circuits for 8086 based micro computer

CO4: **Explain** 8086 based microcomputer interrupt mechanism

CO5: **Explain** the architecture of 8051 micro controller

Course Content	Hours Allotted	Pedagogy
Module I: **Title:**	**(9)**	Power point presentations / Lectures
• Introduction of microprocessor, Evolution of microprocessors	1	
• 8086 architecture- internal block diagram, Signal description of 8086	2	
• Memory segmentation and Register organization	2	
• Operation of 8086 based microcomputer (minimum mode)	2	
• Bus activities during read and write machine cycles	2	
Module II: **Title:**	**(9)**	Case Studies / Review of research articles
• Addressing modes of 8086	1	
• Introduction to programming, standard programming structures	1	
• 8086 instructions set. Data transfer and Arithmetic	2	

Instructions • Logical, Shift, rotate and Loop instructions • Flag manipulation and string instructions • Assembly Language Programs	 2 1 2	
Module III: **Title: Digital Interfacing** • Methods of parallel data transfer and implementing Hand-Shake data transfer • 8255 PPI internal block diagram, system connections, operational modes and initialization • Interfacing a Microprocessor to keyboards • Interfacing a Microprocessor to a Keyboard- Software Keyboard Interfacing • Interfacing to Alphanumeric Displays, software-multiplexed LED displays	**(9)** 2 2 1 2 2	Assignments
Module IV: **Title:** • 8086 Interrupts (external and Internal interrupts) • Interrupt system- interrupt response- Interrupt Pointer Table • 8259A Interrupt priority controller- block diagram and signal description • DMA data transfer, basic block diagram of DMA Controller operation • Introduction to asynchronous serial data communication • 8251A USART: block diagram, signal description, initialization, sending and receiving data	**(9)** 1 2 1 2 1 2	Lectures
Module V: **Title: 8051 Microcontroller** • Introduction to 8051 Microcontroller, difference between Microprocessor and Microcontroller • 8051 Microcontroller functional block diagram, description of various blocks/units • Pin diagram and signal description of 8051 Microcontroller • 8051 registers, flags and stack operation • Internal organization of 8051 memory (RAM and ROM)	**(9)** 2 3 1 2 1	Assignments / Lectures

Learning Resources	
1.	Textbook: • Hall Douglas V, SSSP Rao, 2012, **MICROPROCESSORS AND INTERFACING**. 3rd Edition, Mc Graw Hill (For units- I, II, III and IV) • Mazidi Muhammad Ali, Mazidi Janice Gillispie. 2005. **8051 Microcontroller &**

	Embedded Systems PHI (For unit V)

PYTHON PROGRAMMING

Credits: 3 **Semester: IV**

Course Code: CSIT20403 **No of Lecture Hours: 45**

Course Objective:

- To help the students understand the fundamentals of object-oriented programming.
- To emphasize learning important principles of software development and provide practice in developing small-scale programs.

Course Outcome:

CO1: **Explain** the basics of Python Programming constructs.

CO2: **Sub divides** larger problems into smaller ones using functions

CO3: Apply various data structures for problem solving

CO4: **Apply** object-oriented programming features for solving a given problem

CO5: **Select** an appropriate exception handling depending on application and design file operations using Python standard library

Course Content	Hours Allotted	Pedagogy
Module I: **Title: Basics of Python Programming**	**(9)**	Power point presentations / Lectures
• Features of Python, History of Python, Future of Python, writing and executing first python program, Literal constants-Numbers, strings	2	
• Variables and Identifiers, Data types, Input Operation, comments, Reserved words	1	
• Operators and Expressions in Python, Other Data types- Tuples, dictionary, list. Type conversion	2	
• Decision control statements- if statement, if-else statements, Nested if ,if-elif-else	1	
• Basic Loop structure- while loop, for loop, selecting an appropriate loop, Nested loops, Break statement, continue statement, pass statement, else statement used with loops	3	
Module II: **Title: Functions and modules**	**(9)**	Case Studies / Review of research articles
• Need for functions, function definition, function call, variable scope and lifetime, Return statement, function definition using required argument, keyword argument,	2	

Default argument • Lambda functions, Recursive functions- Greatest common Divisor, finding exponents Fibonacci series • Modules—The from…import statement, Name of module, making your own module • The dir ( ), the Python module, modules and Namespaces • Packages in Python, Standard Library modules, Function redefinition	2 1 2 2	
Module III: **Title: Python String** • **Python String: Introduction—**concatenating, Appending, multiplying strings, Strings are Immutable, string formatting operator • Built-in String methods and functions, slice operation • Ord( ) and chr( ) functions, in and not in operators, comparing and iterating strings • The String module, Regular Expressions—match( ),search( ),sub( ), findall( ), Finditer( ) functions, flag options. Meta characters in Regular expressions • **Data Structures**-Sequence, Lists, Functional programming: filter(),map() and reduce()function, Tuple, sets • Dictionaries—creating dictionary, adding, modifying ,sorting and deleting item in dictionary, looping and nested dictionary, built-in dictionary functions, difference between list and dictionaries	**(9)** 1 1 1 2 2 2	Assignments
Module IV: **Title: Classes and objects** • Introduction, defining classes, creating objects, data abstraction • Class method and self-argument, The __init__() method, class variables and object variables, The __del__() method, other special methods, public and private data members, private methods • Calling a class method from another class method, built-in functions to check, Get, Set and Delete Class Attribute, Built-in class attribute • **Inheritance:** Introduction, inheriting classes in Python, Types of Inheritance • Composition or containership or complex objects, abstract classes and interfaces Meta class • **Operator overloading**—Introduction, Implementing operator overloading, reverse Adding	**(9)** 1 2 1 2 2 1	Lectures
Module V: **Title: Error and Exception Handling** • Introduction to errors and exceptions, handling exceptions	**(9)** 1	Assignments / Lectures

• Multiple except blocks, multiple exception in a single block, except block without exception	1	
• Raising Exceptions, Instantiating exceptions, handling exceptions in invoked functions, Built-in and user defined exceptions, the finally block	2	
• **File Handling**-Introduction, File path, Types of Files-ASCII text file ,Binary file, opening and closing files	2	
• **Reading and writing files**-write(), writelines(),append(),readline()	1	
• File positions, renaming and deleting files, Directory methods	2	

Learning Resources	
1.	**Textbook:** • Thareja, Reema. 2017. **Python Programming**. 3rd Edition. New Delhi: Oxford HED
2.	**Reference books:** • BalaGuruSwamy, E. 2017. **Problem Solving and Python Programming**. 1st Edition. McGraw Hill Education • Dr. R. Nageshwara Rao. 2018. **Core Python Programming**. 2nd Edition. DreamTech Press

Ethical Hacking Lab

Credits: 1 **Semester: IV**
Course Code: CSIT23404 **No of Lecture Hours: 30**

Course Objective:

- To get hands on experience with popular hacking tools and understand various hacking techniques in brief.

Course Outcome:

- Students will be able to learn some of the skills that you would require to become an expert in Ethical Hacking.

S. No	Course Content	Hours Allotted
1.	Using the Open-Source Reconnaissance tool Recon-ng to gather personal information	**6**
2.	Enumeration resources in a Local Machine Using Hyena	**3**
3.	Enumerating services on a target Machine	**3**
4.	Open-Source Information gathering Using Windows Command Line utilities	**3**
5.	Collecting Information about Target Website Using Firebug	**3**
6.	Network Scanning Using Nmap	**3**
7.	Detecting Phishing using Net craft	**3**
8.	Sniffing Facebook Credentials using Social Engineering Toolkit	**3**
9.	Basic Disk Encryption using VeraCrypt	**3**

UNIX SHELL PROGRAMMING LAB

Credits: 1 **Semester: IV**

Course Code: BS18431 **No of Lecture Hours: 30**

Course Objective:

- To understand various commands and programming constructs of shell programming.
- To implement various algorithms of CPU scheduling and memory management algorithms

Course Outcome:

- Students will be able to identify UNIX/Linux utilities and implement shell scripts to perform tasks that are more complex.

S. No	Course Content	Hours Allotted
1.	Introduction to Vi Editor, File and Directory related Commands	**3**
2.	Miscellaneous Commands	**4**
3.	Arithmetic in Shell Scripts	**4**
4.	Sample programs using Shell Script	**3**
5.	Decision making in Shell Script	**4**
6.	Loop control structures in Shell Script	**3**
7.	Implementation of UNIX System calls	**3**
8.	Implementation of CPU Scheduling algorithms	**3**
9.	Implementations of memory management algorithms	**3**

MICROPROCESSORS AND APPLICATIONS LAB

Credits: 1 **Semester: IV**

Course Code: CSIT18405 **No of Lecture Hours: 30**

Course Objective:

- To study hardware and architecture 8086 based microcomputer
- To write and execute various assembly language programs
- To practically experience the interfacing of various I/O devices

Course Outcome:

- Students will be able to explain the configuration 8086 based microcomputer system and execute number of ALPs.

S. No	Course Content	Hours Allotted
1.	Program for addition of two words.	**2**
2.	Program to add an array of n bytes.	**2**
3.	Program for subtraction of two words.	**2**
4.	Program for multiplication of two bytes.	**2**
5.	Program for multiplication of two words.	**2**
6.	Program for division of word by byte.	**2**
7.	Program for division of double word by word.	**2**
8.	Program to reverse a byte.	**2**
9.	Program to reverse a word.	**2**
10.	Program for Interfacing stepper motor	**2**
11.	Program to Display desired characters on the screen	**2**
12.	Program to determine the largest and smallest in an array.	**2**
13.	Program to ascending Order.	**2**
14.	Program to descending order	**2**
15.	Program to move a string	**2**

PYTHON PROGRAMMING LAB

Credits: 1 **Semester: IV**
Course Code: CSIT20406 **No of Lecture Hours: 30**

Course Objective:

- To strengthen problem solving ability by applying the characteristics of an object-oriented approach in Python.
- To build software for real world applications.
- To implement the front end of an application

Course Outcome:

- Students will be able to develop applications using object-oriented concepts of varying complexities.

S. No.	Course Content	Hours Allotted
1.	Basic programs on data types and operators, decision and loop control structure	4
2.	Programs on different functions and modules	4
3.	Programs on various string operations, regular expressions and various data structures: lists, tuples.	5
4.	Programs on dictionary operations and classes and objects	4
5.	Programs on inheritance and operator overloading	5
6.	Programs on errors and exception handling	4
7.	Programs on file handling.	4

Year-wise and Semester-wise Distribution of Subjects
Department of B.Sc. Computer Science and Information Technology
Third Year First Semester
Academic Year 2025-26 of 2023-26 Batch (CBCS)

Sl. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
	THEORY								
1	II	CSIT24501A	Infrastructure Security (DSE-1)	4	3	40	60	100	4
		CSIT24501B	Computer Forensics (DSE-1)						
2	II	CSIT18503	Data Base Management Systems (Core-15)	4	3	40	60	100	4
3	II	CSIT21504	Linux Administration (Core-14)	4	3	40	60	100	4
4	II	CSIT21505	Software Engineering (Core-17)	4	3	40	60	100	4
5	II	CSIT24502	Machine Learning (Core-16)	4	3	40	60	100	4
		PRACTICALS							
6	II	CSIT18506	Data Base Management Systems- Lab (Core-15)	2	3	40	60	100	1
7	II	CSIT24507	Web Programming - Lab (SEC-4)	3	3	40	60	100	2
8	II	CSIT21509	Linux Administration - Lab (Core-14)	2	3	40	60	100	1
9	II	CSIT24510	Machine Learning -Lab (Core-16)	2	3	40	60	100	1
Total				**29**		400	540	940	**26**
10	II	CSIT18508	Internship	-	-	40	-	40	3(NON CGPA)

***Discipline-Specific Elective (DSE) *Skill Enhancement Course (SEC)**

INFRASTRUCTURE SECURITY

(Discipline Specific Elective -1)

(NEW SYLLABUS)

Credits: 4 **Semester: V**

Course Code: CSIT24501A **No. of Lecture hrs: 60**

Course Objective:

- To understand underlying principles of infrastructure security
- To explore software vulnerabilities, attacks, and protection mechanisms
- To learn security aspects of wireless network infrastructure and protocols
- To investigate web server vulnerabilities and their countermeasures
- To develop policies for security management and mitigate security-related risks in the organization
- To Learn the different attacks on Open Web Applications and Web services.

Course Outcomes:

CO1: Understand the concept of attacks and Security protection mechanisms
CO2: Analyze and evaluate attacks on databases and cloud
CO3: Explain the need for OS and Multilevel security
CO4: Explain various risk assessments and IT security
CO5: Evaluate different attacks on Open Web Applications

Sl.No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	
•	Computer Security		
•	Concepts, Threats, Attacks and Assets	2	
•	Security Functional Requirements, Security Design principles	2	Power point presentations / Lectures
•	Attack Surfaces and Attack Trees, Computer Security strategies	2	
•	Access control Principles, Subjects, Objects and Access Rights	2	
•	. Discretionary, role based and Attribute based control	4	
Module II: Title:		**(12)**	
•	Database and Cloud Security	2	
•	Need for database security, DBMS and relational databases	4	Case Studies / Review of

SQL injection attacks, Database Access Control, Inference, Encryption		research articles
• Cloud Computing, Risks and Countermeasures, Data protection in cloud	3	
• Cloud Security as a Service	3	
Module III: Title: Operating System Security	**(12)**	
	3	
• Introduction, System security planning, OS Hardening	3	Assignments
• Application Security, Security Maintenance	3	
Linux, Windows and Virtualization Security	3	
Module IV: Title: IT Security Management and Risk Assessment	**(12)**	
• IT Security Management, Organizational Context and Security Policy	3	Lectures
• Security Risk Assessment, Security Risk Analysis	3	
• IT Security Management Implementation, Safeguards, Security Plan	3	
• Implementation of controls and Monitoring Risks	3	
Module V: Title: Web Security	**(12)**	
• Browser attacks	3	
• Web Attacks Targeting users	3	Assignment / Lectures
• Obtaining User or Website Data	3	
• Email attacks	3	

Learning Resources	
1.	William Stallings and Lawrie Brown. 2015. Computer Security Principles and Practice. 3rd Edition. Pearson Education (UNIT: II, III, IV, V)
2.	PFleeger, Charles P, Pfleeger, Shari Lawrence, Margulies Jonathan. Security in Computing. 5th Edition. Prentice Hall (UNIT: I)

COMPUTER FORENSICS

(Discipline Specific Elective -1)

(NEW SYLLABUS)

Credits: 4 **Semester: V**

Course Code: CSIT24501B **No. of Lecture hrs: 60**

Course Objectives

- Understand the role of Computer Forensics in digital evidence plays in criminal and civil investigations and incident response.

Course Outcomes:

CO1: **To Understand** Computer Forensics in detail.
CO2: **Identify** the types of Evidence and Methods of collecting evidence.
CO3: **To Explain** Computer Forensics analysis and validation
CO4: To **Analyze** Current Computer Forensic tools
CO5: To **Understand** acquisition procedures for cell phones and mobile devices

Sl.No	Course Content	Hours Allotted	pedagogy
Module I: Title: Computer Forensics Fundamentals		**(12)**	
•	What is Computer Forensics Use of Computer Forensics in	2	
•	Law Enforcement.	2	
•	Computer Forensics Services.	2	Power point presentations / Lectures
•	Forensics Methodology	2	
•	Types of Military Computer Forensic Technology	2	
•	Types of Computer Forensics Technology	2	
Module II: Title: Evidence Collection and Data Seizure		**(12)**	
•	Why Collect Evidence, Types of Evidence, The Rules of Evidence.	4	Case Studies / Review of research articles
•	Methods of Collection, Controlling, Contamination	4	
•	Computer Evidence Processing Step	4	
Module III: Title: Computer Forensics analysis and validation		**(12)**	
•	Determining what data to collect and analyze, validating forensic data	2	
•	Addressing data-hiding techniques, performing remote acquisitions	1	
•	Processing Crime and Incident Scenes:	2	Assignments
•	Identifying digital evidence, collecting evidence in private-sector incident scenes.	2	
•	Processing law enforcement crime scenes, preparing for a	2	

search • Securing a computer incident or crime scene • Seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case	 2 1	
Module IV: Title: Current Computer Forensic tools • Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools validating and testing forensics software • E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in email, investigating email crimes and violations, • Understanding email servers, using specialized email forensic tools.	**(12)** 4 4 4	Lectures
Module V: Title: • Cell phone and mobile device forensics: Understanding mobile device forensics, • Understanding acquisition procedures for cell phones and mobile devices • Working with Windows and DOS Systems: Understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, • Understanding whole disk encryption, windows registry	**(12)** 2 1 6 3	Assignment / Lectures

ESSENTIAL READING	
1.	John R. Vacca, Computer Forensics, Computer Crime Investigation, Firewall Media, New Delhi.
2.	Nelson, Phillips Enfinger, Steuart, Computer Forensics and Investigations CENGAGE Learning

REFERENCE READING	
1.	Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison Wesley Pearson Education 2
2.	Forensic Compiling, A Practitioner's Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

DATABASE MANAGEMENT SYSTEMS

Credits: 4 **Semester: V**

Course Code : CSIT18503 **No of Lecture Hours: 60**

Objectives:

- To design a database and enforce Integrity Constraints to keep the database consistent.
- To normalize tables to eliminate redundancies.
- To query relational data using Structured Query Language.
- To understand storage strategies for easy retrieval of data through index.
- To understand PL/SQL and transaction management.

Course Outcomes:

CO1: **Represent** logical database using Entity Relationship and Enhanced ER model.
CO2: **Formulate** database using relational algebra and organize relation using normalization.
CO3: **Design** SQL queries and implements PL/SQL.
CO4: **Classify** the storage and file structure, storage access, indexing and hashing techniques of the database.
CO5: **Explain** the concept of Transactions, recovery system and concurrency control.

SL.No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	
•	Introduction, database applications and purpose	2	Power point presentations / Lectures
	View of data, data base languages-DDL, DML	2	
•	Database architecture, users and administrators	2	
•	Design process overview, Entity relational ship model, Constraints	2	
•	ER diagrams, design issues, weak entity sets	2	
•	Extended ER features	2	
Module II: Title:		**(12)**	
•	Structure of Relational model, Reduction to schema	1	Case Studies / Review of research articles
•	Relational algebra- union, project, select and other operations	3	
•	SQL- data definition, structure, set operations, Aggregate functions	2	
•	Modification of data base, Nested sub queries, views, Joins and Null values	3	
•	Introduction to Normalization, 1NF, 2NF and 3NF, BCNF	3	

Module III: Title:	**(12)**	
• Introduction, Programming, Functions and Procedures	2	
Triggers, Cursors-implicit, explicit, cursor for loops	3	
• Error handling in PL/SQL, Authorization, granting, revoking privileges	3	Assignments
• Roles, Authorization on views, functions and procedures	2	
• Application security	2	
Module IV: Title:	**(12)**	
• Overview of physical storage media	1	
• Magnetic disks- physical characteristics and performance measures	1	
• Buffer manager, replacement policies, File organization	3	Lectures
• Organization of records in files	2	
• Ordered indices, Index sequential-B+ trees	2	
• Static hash function, Dynamic hash function, comparison	3	
Module V: Title:	**(12)**	
• Transactions- concepts, states	1	
• Implementation of Atomicity and durability, Concurrent executions	1	
• Serializability, Recoverability, Testing for Serializability	1	
• Concurrency control, lock-based protocols, locks and granting locks	1	Assignment / Lectures
• Two Phase locking and dead lock handling	2	
• Recovery system, failure	1	
• Storage structure- storage types, data access	1	
Recovery and Atomicity, log-based recovery, Check points	2	
• Distributed Databases- Homogenous & Heterogeneous, Distributed data storage	2	

ESSENTIAL READING	
1.	Korth Henry, F. SilberSchatz Avi. And Sudarshan, S. 2008. **Database System Concepts**. 5th Edition. New Delhi: Tata McGraw-Hill.
2.	Bayross Ivan. 2010. SQL**, PL/SQL- The Programming Language for Oracle.** 4th Edition. New Delhi: BPB Publications.

SUGGESTED READING	
1.	McFadden Fred, R. Hoffer Jeffery, A and Prescott Mary, B. 2007. Modern **Database Management.** 8th Edition. New Delhi: Pearson.
2.	Elmasri Ramez, Navathe and Shamkant, B. 2008. Fundamentals **of Database Systems.** 5th Edition. New Delhi: Pearson Education.

LINUX ADMINISTRATION

Credits : 4 **Semester: V**

Course Code: CSIT21504 **No. of Lecture Hours: 60**

Objective: To learn the basics of Unix/Linux and different Services of Linux

Course Outcomes:

CO1: **Describe** Installation of Linux and User, Group Administration, ACL

CO2: Explain the configuration NFS, FTP and Send mail server

CO3: Explain configuration DHCP and SElinux

CO4: Explain configuration SAMBA and DNS server

CO5: Explain the configuration Apache server, disk quotas

SL No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	
•	History of Linux & GNU- LINUX, Features and Overview of Linux.	1	
•	Difference between Fedora/RHEL,	1	
•	Compressing & Archiving files (bzip2, b2cat, bunzip 2, tar).	1	
•	Permissions, setuid, setgid and sticky bit. Access control lists (getfacl, setfacl)	2	Power point presentations / Lectures
•	Links, Hard Links, Symbolic link, removing a link.	1	
•	User Administration & group Administration.	2	
•	Backing up file, choosing a backup medium, backup utilities, Performing simple backup.	1	
•	The init Demon, Start & Stop System & server, Run levels.	1	
•	Scheduling task using at &crond.	1	
•	Working with nmtui command.	1	
Module II: Title:		**(12)**	
•	Introduction to FTP,security,FTP Connections,FTP Clients.	1	
•	Running FTP and SFTP clients' Basic commands:hostname, get, put, open, prompt, mget.	1	
•	Configuring a vsftpd server description of directives logging in, anonymous users, uploading & downloading files messages.	1	Case Studies / Review of

• Introduction to sendmail, outbound-Email, Inbound email alternatives to send mail • Setting up send mail server Configuring sendmail on a client, mail logs • Additional Email tools, Squirrelmail, difference b/w SMPT, POP3, IMAP • Software Package Administration, Installation/uninstallation/ querying and updating software packages • Introduction to NFS, NFS Client/Server setup, Running an NFS Client • Mounting a remote directory configuring NFS using system-config-nfs	1 1 1 3 1 2	research articles
Module III: Title: • Securing a system, SELinux config: The SELinux configuration file • Getenforce, Setenforce and setstatuscommands • Introduction to DHCP, working of DHCP, DHCP client • dhcpd:the DHCP Daemon , Static IP address, • Virtualization with Xen • RAID levels, LVM • Intro to Web Based administration	**(12)** 2 2 2 2 2 1 1	Assignments
Module IV: Title: • Introduction to SAMBA, Samba utilities & daemons, Samba Users • user Maps, Passwords, running Samba Clients • Working with Shares from Linux, Working with shares from windows • Setting up Samba Server, Configuring Samba Server using System-config-Samba, • Samba config-manually configuring a Samba server parameters in smbd.conf.file • Intro to DNS nodes, domains and subdomains, Zones • Queries, servers, Resource Records DNS working • Setting up a domain using System-config-bind, Setting up a Domain server • Adding resource records	**(12)** 2 2 2 2 1 1 1 1	Lectures
Module V: Title: • Introduction to Firewall, Firewall configuration window • Building a firewall using system-config-firewall. Introduction to Iptables, Filtering a packet in kernel,Anotomy of iptables command.	**(12)** 2 3	
• Apache server introduction, Running apache web server modifyinghttpd.conf configuration file testing apache	3	Assignment / Lectures

• Configuring directives, listen, server Admin, DocumentRoot, Servername , DirectoryIndex,Contexts& Containers	2	
• Disk Quota, Enabling Quota's on partition, Creating Quota's for user.	2	

ESSENTIAL READING	
1.	Christopher Negus, Eric Foster-Johnson. 2009. **Fedora10 and Red Hat Enterprise Linux Bible**. New Delhi: Wiley.
2.	Sobell Mark, G. 2014. **A Practical Guide to Fedora and Red Hat Enterprise Linux.** 7th Edition. New Delhi: Prentice Hall of India.
3.	Vugt Sander van. 2013. **Red Hat Enterprise Linux 6 Administration: Real World Skills for Red Hat Administrators.** USA: SYBEX Inc.
4.	Fox Tammy. 2007. **Red Hat Enterprise Linux 5 Administration UNLEASHED.** SAMS Publishers

SOFTWARE ENGINEERING
(NEW SYLLABUS)

Credits: 4 **Semester: V**

Course code: CSIT21505 **No. of Lecture Hours: 60**

Objectives:

- To enable students, learn software engineering principles
- To learn the theoretical foundation from the view of object-oriented concept.

Course Outcomes:

CO1: **Design** software through various process models.
CO2: **Analyze** Object Oriented concepts and various Models.
CO3: **Choose** different designs and architectures.
CO4: **Explain** components, golden rules and design evaluation.
CO5: **Select** testing techniques and determine its quality.

SL.No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	Power point presentations / Lectures
•	The evolving role of software, software, changing nature of software	2	
•	Legacy Software, Software Myths	2	
•	Software engineering-layered technology, Process Framework	2	
•	CMMI, Process patterns, Personal and Team Process models	1	
•	Process Models: waterfall, incremental, evolutionary process models	2	
•	Agile process models	3	
Module II: Title:		**(12)**	Case Studies / Review of research articles
•	Requirements Engineering tasks, initiating requirements engineering process	2	
•	Eliciting requirements	1	
•	Developing Use Cases, Building analysis model	2	
•	Negotiating and validating requirements	1	
•	Requirements analysis, analysis modeling approaches, Data modeling Concepts	2	
•	Object oriented analysis, Scenario based modeling, Flow oriented modeling	2	
•	Class based modeling, creating behavioral models, Case Study	2	

Module III: Title: • Design Process and Quality • Design concepts and Design model • Pattern Based software design • Software architecture, Data design Architectural styles and Patterns • Architectural design, Assessing alternative architectural design • Managing Data flow into Software architecture	**(12)** 2 2 2 2 2 2	Assignments
Module IV: Title: • Introduction to Component, designing class based components • Conducting component level design, Object constraint language • Design conventional components • Golden rules, User Interface Analysis and Design • Interface analysis, Interface design steps • Design Evaluation	**12Hrs** 2 2 2 2 2 2	Lectures
Module V: Title: • A Single approach to Software testing • Strategic issues, Test strategies for Conventional Software • Validation testing, System Testing • Testing fundamentals, Black box and White Box Testing • Basis Path Testing, Control Structure Testing • Software quality • Metrics for analysis model • Metrics for design model, Metrics for source code • Metrics for testing, Metrics for maintenance.	**12Hrs** 1 1 1 2 2 1 2 1 1	Assignment / Lectures

SSENTIAL READING	
1.	Pressman, Rogers S. 2015. Software Engineering, A practitioner's Approach. 6th Edition. McGraw Hill Education

SUGGESTED READING	
1.	Deepak Jain. 2009. **Software Engineering.** New Delhi: Oxford University Press.
2.	Rajib Mall. 2009. **Fundamentals of Software Engineering.** 3rd Edition. New Delhi: PHI.
3.	Sommerville. 2007. **Software Engineering.** 7thEdition.New Delhi: Pearson Education.

MACHINE LEARNING

(NEW SYLLABUS)

Credits: 4 **Semester: V**

Course Code: CSIT24502 **No. of Lecture hrs: 75**

Course Objectives

- To understand the concepts of machine learning
- To understand supervised and unsupervised learning and their applications
- To learn aspects of computational learning theory

Course Outcomes:

CO1: Have a good understanding of the fundamental issues and challenges of machine learning and basics of Python for Machine Learning

CO2: Classify the supervised learning algorithms and apply to the given data set.

CO3: Identify the underlying relationships within and across unsupervised Machine Learning algorithms

CO4: Evaluate and interpret the results of Neural Networks

CO5: Design and implement advanced machine learning algorithms

SL No	Course Content	Hours Allotted	pedagogy
Module I: Title: Introduction to Machine Learning		**(15)**	Power point presentations / Lectures
•	Overview of Machine Learning -Definition, scope, and applications	2	
•	Types of learning: supervised, unsupervised, reinforcement.	3	
•	Basic concepts and Python basics for ML Understanding datasets, features and labels	3	
•	Exploratory data analysis, data visualizations	3	
•	Libraries: NumPy, Pandas, Matplotlib.	4	
Module II: Title: Supervised Learning		**(15)**	**Case Studies / Review of research articles**
•	Linear Regression -Basic and Mathematical Representation	4	
•	Introduction to regression Linear and multiple regression Classification Algorithms	3	
•	Logistic Regression, K-NN, Decision Trees, SVM.	4	

• Evaluation metrics: accuracy, precision, recall.	4	
Module III: Title: Unsupervised Learning	**(15)**	**Assignments**
• Clustering - K-Means, Hierarchical	5	
• Dimensionality Reduction – PCA	**5**	
• Association Rule Learning - Apriori algorithm.	5	
Module IV: Title: Introduction to Neural Networks	**(15)**	**Lectures**
• Basics of Neural Networks - Neurons, layers, activation functions.	5	
• Feedforward and backpropagation.	5	
• Types of Neural Networks - MLPs, CNNs, RNNs.	5	
Module V: Title: Advanced Topics in Machine Learning	**(15)**	**Assignment / Lectures**
• Natural Language Processing (NLP) Basics and applications in text processing.	4	
• Transfer Learning - Understanding transfer learning. Application of pre-trained models.	4	
• Artificial Intelligence Integration Exploring intersections between AI and ML. Applications and synergies.	3	
• Reinforcement Learning Fundamentals Basics, algorithms, and key concepts.	4	

ESSENTIAL READING	
1.	An Introduction to Machine Learning & quot; by Alpaydin, Ethem (Edition: 4th, Year: 2020)
2.	Python Machine Learning & quot; by Raschka, Sebastian (Edition: 3rd, Year: 2019)
3.	Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow & quot; by Géron,
4.	Aurélien (Edition: 2nd, Year: 2019)

SUGGESTED READING:	
1.	Machine Learning Yearning & quot; by Ng, Andrew (Edition: 1st, Year: 2018)
2.	Pattern Recognition and Machine Learning & quot; by Bishop, Christopher M. (Edition: 1st, Year: 2006) - Note: This one is slightly older but highly regarded in the field.

DATABASE MANAGEMENT SYSTEMS LAB

Credits : 1 **Semester: V**

Course Code: CSIT18506 **No. of Practical Hours: 30**

Objectives:

- To present the concepts and techniques relating to query processing by SQL engines.
- To present SQL and procedural interfaces to SQL comprehensively.

Outcome: Students will be able to use commercial relational database system (Oracle) by writing Queries using SQL and implement PL/SQL.

No.of Hours	Topics
1	Data definition language commands
2	Data manipulation language commands
3	Simple to complex condition query creation using SQL Plus
4	Queries involving set operators, aggregate functions
5-6	Queries involving scalar function: String, Numeric, Conversion and Date
7	Queries involving group-by and having clause, order by clause
8	Queries involving sub-queries and views
9	Queries involving types of joins-inner, outer joins
10	Queries involving forms and reports
11	Queries involving Data control and transactional commands
12	Creating simple PL/SQL programs involving loop and decision
13	Creating PLSQL cursors, triggers
14	Creating PL/SQL procedures and functions
15	Creating PL/SQL programs for error handling

NOTE:

1. Creation of sample Database consisting of Employee, Department and Grade tables.
2. Creation of other databases suitable for the course.

WEB PROGRAMMING LAB

(NEW SYLLABUS)

Credits: 2 **Semester: V**

Course Code: CSIT24507 **No. of Lecture hrs: 30**

Course Objectives

- To develop web applications using HTML, JavaScript, XML

Course Outcomes:

- Students will be able to develop dynamic web pages using Java Script, gain knowledge in server-side scripting

S. No	Topics
1.	Programs to demonstrate basic HTML tags.
2.	Programs to demonstrate on different types of lists.
3.	Programs to demonstrate frames
4.	Programs to demonstrate forms
5.	Programs to demonstrate tables.
6.	Programs to demonstrate hyperlinks
7.	Programs to demonstrate on inline, external, embedded style sheets.
8.	Programs to demonstrate control structures.
9.	Write a JavaScript program on functions.
10.	Write a JavaScript program on arrays
11.	Write a JavaScript program on form validation
12.	Programs to create a simple login and register form
13.	Accept 10 numbers from user and display sum and average in JavaScript
14.	Demonstrate the structure of XHTML document.
15.	Write a Django program to demonstrate an admin page.
16.	Write a Django program to demonstrate templates
17.	Write a Django program to demonstrate URLs and views.

LINUX ADMINISTRATION LAB

Credits : 1 **Semester: V**

Course Code : CSIT21509 **No. of Practical Hours: 30**

Objective: To get hands on experience on installations, configuration of server service roles and email servers and clients.

Outcome: Students will be able to demonstrate the core system-administration skills required in Red Hat Enterprise Linux environments.

No. of Hours	TOPICS
1.	Installation of Red hat Enterprise Linux and Fedora.
2.	Creating, deleting and modifying users and group using commands and Graphical tool.
3.	Assigning advanced files permissions, Creating, modifying and deleting ACL's, usage of rpm, tar.
4.	Creating Quotas for users, using dump and restore.Automation of tasks using at and crond.
5.	Configuring FTP Client and Server for uploading and downloading files
6.	Configuring Postfix mail Server
7.	Configuration of Squirrel Mail to compose the mail on GUI mode
8.	Configuration of NFS server
9.	Configuration of DHCP
10.	GUI Based application to manage n/w via browser webmin administration
11.	Configuration of SAMBA
12-13	Configurations of DNS
14-15	Configuration of Apache Server

MACHINE LEARNING LAB

(NEW SYLLABUS)

Credits: 1 **Semester: V**

Course Code: CSIT24510 **No. of Lecture hrs: 30**

PROGRAMS

1. Linear Regression
2. Logistic Regression
3. K Nearest Neighbour (KNN)
4. Decision Tree algorithm
5. Support Vector Machine (SVM)
6. K Means algorithm
7. Apriori algorithm
8. Artificial Neural Networks (ANN)

CASE STUDIES

Case Study 1: Movie Recommendation System

- Scenario: An online streaming platform wants to enhance user experience by recommending movies based on user preferences.
- Objective: Develop a basic recommendation system using user ratings and movie metadata.
- Tasks:
  - Explore and preprocess movie ratings data.
  - Implement a simple collaborative filtering algorithm.
  - Evaluate the recommendation system' s effectiveness.

Supervised Learning

Case Study 2: Predicting Housing Prices

- Scenario: A real estate agency wants to predict housing prices based on various features like square footage, number of bedrooms, and location.
- Objective: Build a regression model to predict house prices.
- Tasks:
  - Collect and preprocess housing data.
  - Train a linear regression model using scikit-learn.
  - Evaluate the model' s performance and

interpret coefficients.

Unsupervised Learning

Case Study 3: Customer Segmentation for an E-commerce Platform

- Scenario: An online retailer wants to understand its customer base and tailor marketing strategies.
- Objective: Apply clustering algorithms to segment customers based on their purchasing behaviour.
- Tasks:
  - Analyse and preprocess customer transaction data.
  - Apply K-Means clustering to identify customer segments.
  - Visualize and interpret the customer segments.

Neural Networks

Case Study 4: Image Classification of Animals

- Scenario: A zoo wants to automate the classification of animals in images captured by security cameras.
- Objective: Build a neural network model to classify images into different animal categories.
- Tasks:
  - Collect and preprocess a dataset of animal images.
  - Implement a simple neural network using a deep learning framework.
  - Train the model and assess its accuracy.

INTERNSHIP

Credits: 3 **Semester: V**

Course Code: CSIT18508

Third year students take up an On Job Training in the domain of Networking, PC Hardware Installation and Trouble Shooting, or Network Administration during summer for 4 weeks which carries a total of 40 marks evaluated internally during 5th Semester.

The Criteria for the Internal Evaluation of On Job Training (OJT) Work for 40 marks is as follows:

1.	Attendance	5 marks
2.	Internal Presentation (Presentation and Communication skills)	10 marks
3.	Internal OJT presentation /Practical demonstration (Objectives, work submission, methodology, results, Practical relevance evaluated by the faculty)	15 marks
4.	OJT Report	10 marks

Year-wise and Semester-wise Distribution of Subjects
Department of B.Sc. Computer Science and Information Technology
Third Year Second Semester
Academic Year 2025-26 of 2023-26 Batch (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
	THEORY								
1	II	CSIT24601A	Distributed Systems and Cloud Computing (DSE-2)	4	3	40	60	100	4
		CSIT21601B	Internet of Things (DSE-2)						
2	II	CSIT21602A	Web Application Testing (DSE-3)	4	3	40	60	100	4
		CSIT24602B	Python Scripting (DSE-3)						
3	II	CSIT21603	Cryptography and Network Security (Core-18)	4	3	40	60	100	4
	PRACTICALS								
4	II	CSIT21604A	Web Application Testing- Lab (DSE-3)	2	3	40	60	100	1
		CSIT24604B	Python Scripting- Lab (DSE-3)						
5	II	CSIT18605	Major Project	15	3	40	60	100	6
Total				**29**	-	200	300	500	**19**

***Discipline-Specific Elective (DSE)**

DISTRIBUTED SYSTEMS AND CLOUD COMPUTING
(Discipline Specific Elective-2)
(NEW SYLLABUS)

Credits: 4 **Semester: VI**

Course Code: CSIT24601A **No. of Lecture hrs: 60**

Course Objectives

- To enable students with the concepts of distributed environment, uses, replications and security issues.
- To implement Basics, techniques and tools for Cloud Computing.
- To understand any kind of heterogeneous resources over a network using open standards

Course Outcomes:

CO1: To inculcate knowledge on Hardware requirement of distributed systems and communications.
CO2: To illustrate the concepts of Distributed File Systems and Distributed Web-based Systems.
CO3: Identify different types of clouds
CO4: Analyze virtualization and data center working procedure
CO5: Classify public cloud platforms

SL.No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	Power point presentations / Lectures
•	Introduction: Goals and Types of Distributed Systems Architectures: Architectural Styles	3	
•	Architectures versus Middleware, and Self-Management in Distributed Systems.	3	
•	Processes: Threads, Virtualization, Clients, Servers, and Code Migration.	3	
•	Communication: Remote Procedure Call Message-Oriented Communication, Stream-Oriented Communication, and Multicast Communication.	3	
Module II: Title:		**(12)**	Case Studies
•	Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization	2	
•	Consistency and Replication, Fault Tolerance, and Security.	3	
•	Distributed Web-Based Systems: Architecture, Processes	2	

• Communication, Naming, Synchronization • Consistency and Replication, Fault Tolerance, and Security	3 2	/ Review of research articles
Module III: Title: • Cloud Computing -Introduction, The cloud reference model: Architecture, Infrastructure-and Hardware-as-a-service, Platform as a service, Software as a service. • Types of clouds: Public clouds, Private clouds, Hybrid clouds, Community clouds, Economics of Cloud • Open challenges: Cloud definition, Cloud interoperability and standards, Scalability and fault tolerance, Security, trust, and privacy, Organizational aspects	**(12)** 4 4 4	Assignments
Module IV: Title: • Introduction and characteristics of virtualized environments: Increased Security, Managed Execution, Portability • Taxonomy of Virtualization techniques: Execution virtualization • Virtualization and Cloud Computing • Pros and Cons of Virtualization • Technology examples VM ware: full virtualization, Microsoft Hyper V	**(12)** 3 3 2 1 3	Lectures
Module V: Title: • Amazon web services- Compute services, Storage services, Communication services, Google App Engine- Architecture and core concepts • Application life cycle, Microsoft Azure - Azure core concepts, SQL Azure • Cloud applications- Scientific applications- Healthcare: ECG analysis in the cloud • Business and consumer applications - Media applications Multiplayer online gaming	**(12)** 2 3 3 4	Assignment / Lectures

ESSENTIAL READING	
1.	Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems, PHI 2nd Edition, 2009.
2.	R. Hill, L. Hirsch, P. Lake, S. Moshiri, Guide to Cloud Computing, Principles and Practice‖, Springer, 2013.
3.	Buyya, Raj Kumar, Vecchiola, Christian. And Selvi, Thamarai S. 2012. Mastering Cloud Computing. New Delhi:TMH

INTERNET OF THINGS
(Discipline Specific Elective- 2)
(NEW SYLLABUS)

Credits : 4 **Semester: VI**

Course Code: CSIT21601B **No. of Lecture Hours: 60**

Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Course Outcomes:

CO1: **Identify** the importance of IOT and its applications
CO2: **Differentiate** between IOT and M2M, SDN and NFV
CO3: **Understand** building of IOT devices and Raspberry PI
CO4: **Explain** the working of WAMP server and AWS
CO5: Understand applications and analytics of IoT

Sl.No	Course Content	Hours Allotted	pedagogy
	Module I: Title	**(12)**	
	INTRODUCTION AND CONCEPTS		
	• Introduction to Internet of Things –Definition and Characteristics of IoT	3	**Power point presentations / Lectures**
	• Physical Design of IoT, Logical Design of IoT	3	
	• IoT Enabling Technologies	3	
	• IoT Levels and Deployment Templates, Domain Specific IoTs – Home Automation Cities, Environment, Agriculture, Industry, health and Lifestyle	3	
	Module II: Title:	**(12)**	
	IoT and M2M		
	• IoT and M2M- Introduction to M2M, Difference between IoT and M2M	2	**Case Studies / Review of research articles**
	• SDN and NFV for IoT	3	
	IoT SYSTEM MANAGEMENT WITH NETCONF-YANG		
	• Need for IoT Systems Management, SNMP	2	
	• Network Operator requirements, NETCONF, YANG	2	
	• IoT Systems Management with NETCONF-YANG	1	
	• IoT Platforms Design Methodology: Introduction, IoT	2	

Design Methodology		
Module III: Title: **IoT PHYSICAL DEVICES AND ENDPOINTS** • Building blocks of IoT device • Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces • Programming Raspberry Pi with Python • Other IoT devices	**12 Hrs** 2 3 5 2	**Assignments**
Module IV: Title: **IoT PHYSICAL SERVERS AND CLOUD OFFERINGS** • Introduction to Cloud Storage models and Communication API • WAMP-AutoBahn for IoT, Xively Cloud for IoT • Python web application framework-Django • Designing a RESTful web API • Amazon Web Services for IoT	**12 Hrs** 1 3 3 3 2	**Lectures**
Module V: Title: (SOURCE CODE EXCLUDED) • Python packages of Interest for IoT - JSON, XML, HTTPLib, URLLib, SMTPLib **Case Studies Illustrating IoT Design** • Home Automation- Smart Lighting, Home Intrusion Detection • Cities- Smart Parking **Data Analytics for IoT** • Introduction, Apache Hadoop • Using Hadoop MapReduce for Batch Data Analysis • Apache Spark	**12 Hrs** 3 2 3 2 2	**Assignment / Lectures**

ESSENTIAL READING	
1.	Bahga, Arshdeep and Madisetti, Vijay. 2015. Internet of Things - A Hands-on Approach. Universities Press ISBN: 9788173719547
2.	Richardson, Matt and Wallace, Shawn. 2014. Getting Started with Raspberry Pi. O'Reilly (SPD). ISBN: 9789350239759

WEB APPLICATION TESTING
(Discipline Specific Elective-3)
(SYLLABUS FOR NEW COURSE)

Credits: 4 **Semester: VI**

Course Code: CSIT21602A **No. of Lecture Hours: 60**

Objectives:

- To study the concepts of web application testing
- To learn different testing methods on server side and client side

Outcomes:

CO1: **Identify** Web application technologies
CO2: **Experiment** using Client-Side Controls
CO3: **Explain** authentication and authorization
CO4: **Implement** SQL injection
CO5: **Develop** Cross-Site Scripting

SL.No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(12)**	**Power point presentations / Lectures**
•	Introduction of Web Applications, Benefits and Security of Web Applications	2	
•	The New Security Perimeter and The Future of Web Application Security	3	
•	Core Defense Mechanisms: Handling User Access, Handling User Input	3	
•	Approaches to Input Handling Sanitization	1	
•	Web Application Technologies: The HTTP Protocol and Web Functionality	3	
Module II: Title:		**(12)**	**Case Studies / Review of research articles**
•	Mapping the Application, Enumerating Content and Functionality	2	
•	Analyzing the Application identifying Entry Points for User Input	3	
•	Bypassing Client-Side Controls, Transmitting Data Via the Client	3	
•	Capturing User Data: HTML Forms and Browser Extensions Handling Client-Side Data Securely	1 3	
Module III: Title:		**(12)**	
•	Attacking Authentication, Authentication Technologies	2	
•	Design Flaws in Authentication	3	

• Implementation Flaws in Authentication • Attacking Session Management, Weaknesses in Token Generation • Weaknesses in Session Token Handling and Securing Session Management	3 1 3	**Assignments**
Module IV: Title: • Attacking Data Stores: Bypassing a Login, Injecting into SQL • Exploiting a Basic Vulnerability, Injecting into Different Statement Types • Finding SQL Injection Bugs, Finger printing the Database • Injecting into NoSQL (MongoDB) and injecting into XPath • Subverting Application Logic, Informed And Preventing XPath Injection	**(12)** 2 3 3 1 3	**Lectures**
Module V: Title: • Attacking Application Logic: The Nature of Logic Flaws • Real-World Logic Flaws, Avoiding Logic Flaws • Attacking Users: Cross-Site Scripting • Varieties of XSS, Reflected XSS Vulnerabilities • Stored XSS Vulnerabilities and DOM-Based XSS Vulnerabilities	**(12)** 2 3 3 1 2	**Assignment / Lectures**

ESSENTIAL READING	
1.	Dafydd Stuttard, Marcus Pinto**. 2011. The Web Application Hacker's Handbook Finding and Exploiting Security Flaws.** 2nd Edition. John Wiley & Sons Inc.
2	Gupta, Richa. 2021. **Hands-on Penetration Testing for Web Applications. 1st** Edition. BPB Publications. India: New Delhi

PYTHON SCRIPTING
(Discipline Specific Elective-3)
(NEW SYLLABUS)

Credits: 4 **Semester: VI**

Course Code: CSIT24602B **No. of Lecture hrs: 60**

Course Objectives

To understand various advanced programming concepts of Python

Course Outcomes:

CO1: Understand the paradigm of scripting
CO2: Usage of Python to work with numbers
CO3: Build Interactive applications with GUI concepts
CO4: Apply network programming and e-mail
CO5: Use XML with Python

SL.No	Course Content	Hours Allotted	pedagogy
Module I: Title: Introduction to Regular Expressions		**(12)**	**Power point presentations / Lectures**
•	Regular Expressions	2	
•	Values and types	2	
•	Variables, storage and control	2	
•	Bindings and scope	1	
•	Procedural Abstraction and Data Abstraction	3	
•	Separate compilation and Module library	2	
Module II: Title: Numerical Programming		**(12)**	**Case Studies / Review of research articles**
•	Numbers in Python-Integers, Long Integers, Floating point numbers	3	
•	Formatting Numbers and Characters as Numbers	3	
•	Mathematics- Arithmetic and Built-in Math functions	2	
•	Complex Numbers	2	
•	Arrays-The Array Module	2	
Module III: Title: GUI Programming		**(12)**	**Assignments**
•	Writing a GUI with Python-GUI Programming Toolkits for Python	2	
•	Tkinter Introduction	1	
•	Creating GUI Widgets with Tkinter	2	
•	Resizing the Widget, Configuring Widget Options	2	

• Putting the Widgets to work • Radio Buttons, Checkboxes and Dialog Boxes	2 3	
Module IV: Title: **Network Programming** • Understanding Protocols-Comparing Protocols and Programming Languages • The Internet Protocol Stack and about the Internet Protocol • Sending Internet E-mail – The E-mail Format • MIME Messages • Retrieving Internet e-mail-Parsing a Local Mail Spool with mailbox, Fetching Mail from a POP3 Server with poplib	**(12)** 2 2 2 3 3	**Lectures**
Module V: Title: **Using Python for XML** • What is XML? - A Hierarchical Markup Language, A Family of Standards. What is a Schema/DTD-What Are Document Models For? Do You Need One? • Document Type Definitions-An Example DTD, DTDs Aren't Exactly XML, Limitations of DTDs • Schemas-An Example Schema, Schemas Are Pure XML, Schemas Are Hierarchical, Other Advantages of Schemas • X Path and HTML as a subset of XML-The HTML DTDs, HTML Parser, XML Libraries Available for Python • What Is SAX? - Stream-based, Event-driven, What Is DOM? In-memory Access Why Use SAX or DOM - Capability Trade-Offs, Memory Considerations, Why Use SAX or DOM -Capability Trade-Offs, Memory Considerations, Speed Considerations. SAX and DOM Parsers Available for Python- xml. sax, xml. dom.minidom	**(12)** 2 2 3 2 3	**Assignment / Lectures**

ESSENTIAL READING	
1.	Beginning Python®: Using Python 2.6 and Python 3.1- James Payne (Unit-2, Unit-3, Unit-4, Unit-5)
2.	PROGRAMMING LANGUAGE DESIGN CONCEPTS- David A. Watt with contributions by William Findlay (Unit-1)

CRYPTOGRAPHY AND NETWORK SECURITY
(NEW SYLLABUS)

Credits : 4 **Semester: VI**

Course Code : CSIT21603 **No. of Lecture Hours: 60**

Objective: To provide issues related to security in modern Networked Computer Systems.

Course Outcomes:

CO1: **Identify** information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
CO2: **Apply** Public Key Cryptographic Technique for securing messages
CO3: Use an appropriate message authentication code.
CO4: **Compare** the performance of different message digest algorithms for verifying the integrity of varying message sizes
CO5: **Compare** different IEEE standards and electronic mail security

Sl.No	Course Content	Hours Allotted	pedagogy
Module I: Title: INTRODUCTION		**(12)**	
	Introduction to Security, Critical Characteristics of Information, The OSI Security Architecture, Security Attacks	2	
	• Security Services and Mechanisms	1	
	• A model for Network Security	1	
	• NSTISSC Security Model, Components of Information Security	2	
CLASSICAL ENCRYPTION TECHNIQUES			**Power point presentations / Lectures**
	• Symmetric cipher model	1	
	• Substitution Techniques-Caesar Cipher, Mono alphabetic cipher	1	
	• Play fair cipher, Hill cipher, Polyalphabetic cipher, Transposition Techniques	2	
	• The DES encryption, Details of Single Round, Key Generation	1	
	• DES Decryption, The Avalanche Effect, The Strengths of DES	1	

Module II: Title: **MORE ON SYMMETRIC CIPHERS** • Multiple Encryption and Triple DES • Key Distribution, Random Number Generation **PUBLIC-KEY CRYPTOGRAPHY AND RSA** • The principles of public-key cryptosystems and essential steps of public key Crypto systems, public key encryption to provide Authentication, Applications of Public key cryptosystems, Requirements for public-key cryptography, Public-key cryptanalysis • The RSA algorithm-Description of algorithm, computational Aspects, Key generation and Security of RSA • RC4Stream Cipher	**(12)** 2 2 3 2 3	**Case Studies / Review of research articles**
Module III: Title: **KEY MANAGEMENT** • Distribution of public keys, public announcement of public keys, publicly available directory, public-key Authority, public-key Certificates, Distribution of secret keys using public-key cryptography • Diffie-Hellman key exchange **MESSAGE AUTHENTICATION** • Authentication Requirements, Authentication Functions-Message Encryption, Message Authentication code, Hash Functions-Requirements for a hash function, Simple Hash Functions, Birthday Attacks, Block Chaining Techniques • Security of Hash functions and MACS-Brute-force attacks, Message Authentication codes	**(12)** 3 3 3 3	**Assignments**
Module IV: Title: • Secure Hash Algorithm (SHA), MD5 Algorithm. • Kerberos, X.509 Authentication Services • Digital Signatures • Whirlpool	**(12)** 3 3 3 3	**Lectures**
Module V: Title: **E-MAIL SECURITY** • E –Mail System • Pretty Good Privacy, S/MIME.	**(12)** 1 3	
IP SECURITY • Overview, Architecture, Authentication Header, Encapsulating security payload, combining security associations, key management	 3	**Assignment / Lectures**

• Modes of IPSEC	2	
WEB SECURITY		
• Web Security Considerations, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction	3	

ESSENTIAL READING	
1.	Stallings, William. 2005. **Cryptography and Network Security Principles and Practices.** 4th Edition. New Delhi: Prentice Hall of India.

SUGGESTED READING	
1.	Forouzan, Behrouz A. 2008. **Cryptography and Network Security.** Special Indian Edition**.** New Delhi**:** Tata McGraw-Hill.

WEB APPLICATION TESTING LAB
(Discipline Specific Elective-3)
(LAB SYLLABUS FOR NEW COURSE)

Credits: 1 **Semester: VI**

Course Code: CSIT21604A **No. of Practical Hours: 30**

Objective: To get hands on experience on installation and configuration of burp suite and to identify different vulnerabilities present in web applications.

Outcome: Students will be able to test for different vulnerabilities present in web applications

No. of Hours	Topics
1.	Learn the top 10 vulnerabilities from OWASP
2	Installation of burp suite and configuring burp suite to browser.
3.	Testing for account enumeration and guessable user accounts
4.	Testing for weak password policy
5.	Testing for privilege escalation
6.	Testing for insecure direct object references
7.	Testing for session fixation
8.	Testing for cross site request forgery (CSRF)
9.	Testing for reflected cross site scripting
10.	Testing for stored cross site scripting
11.	Testing for SQL injection
12.	Testing for http verb tampering
13.	Testing for SSL/TLS
14.	Testing for click jacking
15.	Testing for cross origin resource sharing

PYTHON SCRIPTING LAB
(*Discipline Specific Elective-3)*
(NEW SYLLABUS)

Credits: 1 **Semester: VI**

Course Code: CSIT24604B **No. of Lecture hrs: 30**

Course Objectives

- To understand various concepts of advanced programming and implement them

1. Programs on Regular Expressions
2. Programs using Numbers in Python
3. Programs on Arithmetic and Math Built-in functions
4. Program to implement Array Module
5. Programs on GUI Widgets with T-kinter
6. Programs on checkboxes, radio- buttons and dialog boxes
7. Programs to implement XML using SAX and HTML Parser

MAJOR PROJECT

EVALUATION CRITERIA FOR MAJOR PROJECT

Credits : 6 **Semester: VI**
Course Code: CSIT18605 **No. of Practical Hours: 15**

Third year students in the Sixth Semester are required to take up project work which carries a total of 100 marks i.e. internal 40 marks and an external 60 marks.

The criteria for the Internal Evaluation of Project for 40 marks are as follows:

1.	Attendance	5 marks
2.	Review of weekly report	5 marks
3.	Internal Project Presentation–every weekend (Presentation & communication skills, objectives, Work submission, methodology, results, and Practical relevance.)	10 marks
4.	Final internal presentation- at the end of semester (50% marks Evaluation done by the internal guide, and 50% marks evaluated by other internal lecturers guiding the projects)	15 marks
5.	Project Report	5 marks

External Evaluation of the Project (60 marks): The Controller of Examination sends the Project Reports to the External Examiner in advance. The External Examiner evaluates the project for 60 marks based on project work done by the student. (The Project Report is evaluated for 40 marks and Viva-voce for 20 marks.)

OFFICE AUTOMATION

(BRIDGE COURSE)

(For first year students admitted from 2020-21 onwards)

Credits : 00 **Semester: I**

Course Code: CSIT016A **No. of Hours: 15**

Objectives:

- To provide an in-depth understanding of the use of office automation packages
- To get acquainted with IT.

Outcomes: Students would be able to prepare documents, spreadsheets, make small presentations and would be acquainted with internet.

Module 1
OFFICE APPLICATIONS – I
MS Word-Working with Documents, Formatting Documents, Setting Page style, Creating Tables, Drawing, Tools, Printing Documents.

Module 2
OFFICE APPLICATIONS – II
MS Excel-Entering & Deleting Data, Setting Formula, Formatting Spreadsheets, working with sheets, Creating Charts.

Module 3
OFFICE APPLICATIONS – III
MS Access: Introduction, planning a Database, Starting Access, Access Screen, creating a New Database, Creating Tables, Working with Forms, creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases viz. MS Excel etc.

Module 4
OFFICE APPLICATIONS - IV
MS Power Point-Creating a presentation, formatting a Presentation, Adding Effects to the Presentation, Printing Handouts.

Module 5

ADVANCED COMMUNICATIONS
Introduction to various devices & Applications: Other than the computers, (electronic gadgets), which are widely using by executives in the Offices – Tablet, Smart Phone – concept of mobile phone and Tablet and their uses – Various applications using by Tablets and Smart Phones such as UC browser, WhatsApp, Maps, Skype.

Essential Readings:	
1.	John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki. Microsoft Office 2007 Bible. Wiley India pvt.ltd.
2.	A Conceptual Guide to OpenOffice.org 3 - R. Gabriel Gurley- Create Space Independent Publishing Platform, 2008

INFORMATION TECHNOLOGY ACT
(SELF-LEARNING COURSE)

Semester: IV **No. of Hours: 30**

Objectives:

- To keep cybercrimes in check
- To protect sensitive data against potential cyber threats

Outcome: Students will be able gain knowledge on cyber laws and IT security.

Module I: Title • Introduction to Cyber Law & IT Act Overview • Cyberspace, Cyber security, Cyber security Policy and Cyber Crime • Information Technology Act, Mission and Vision Cyber security Program • Cyber Law – Objectives, Emerging Trends of Cyber Law • Create Awareness, Areas of Development	**6Hrs**
Module II: Title: • Cyber Law - Intellectual Property Right • Types of Intellectual Property Rights • Advantages of Intellectual Property Rights • Intellectual Property Rights in India • Intellectual Property in Cyber Space	**6Hrs**
Module III: Title: • Cyber Law - Strategies for Cyber Security • Strategy 1 − Creating a Secure Cyber Ecosystem • Strategy 2 − Creating an Assurance Framework • Strategy 3 − Encouraging Open Standards • Strategy 4 − Strengthening the Regulatory Framework • Strategy 5 − Creating Mechanisms for IT Security • Strategy 6 − Securing E-Governance Services • Strategy 7 − Protecting Critical Information Infrastructure	**6Hrs**
Module IV: Title: • Cyber Law - Policies to Mitigate Cyber Risk • Mitigate Risks through Human Resource Development • Cyber Law - Network Security, Types of Network Security Devices and Firewalls	**6Hrs**
• Antivirus, Content Filtering, Intrusion Detection Systems • Cyber Law - I.T ACT, Features of I.T Act	

Module V: Title:	**6Hrs**
• Scheme of I.T Act, Application of the I.T Act and Amendments Brought in the I.T Act • Intermediary Liability, Highlights of the Amended Act • Cyber Law – Signatures: Digital Signature • Electronic Signature and Digital Signature to Electronic Signature • Cyber Law - Offence & Penalties, Offences and Compounding of Offences	

POWER SHELL SCRIPTING
(ADD-ON COURSE)

Semester: VI **No. of Hours: 30**

Objectives:

- To enable students, learn is a command-line shell and Scripting Language designed especially for system administration

Outcome: Students will be able to control and automate the administration of the Windows operating system and applications that run on Windows Server environment.

SL. No	Course Content	Hours Allotted	pedagogy
Module I: Title:		**(6)**	**Power point presentations / Lectures**
•	Introduction to PowerShell ISE	1	
•	PowerShell Basic Commands	1	
•	PowerShell - Environment Setup	2	
•	Difference between PowerShell and PowerShell ISE	1	
•	Introduction to PowerShell Console, Scripting File and the Command Module	1	
Module II: Title:		**(6)**	**Case Studies / Review of research articles**
•	PowerShell Basic Commands	2	
•	PowerShell - cmdlets: Cmdlet vs Command	1	
•	PowerShell - Files and Folder Operations	1	
•	PowerShell - Date and Time Operations	1	
•	PowerShell - File I/O Operations	1	
Module III: Title:		**(6)**	**Assignments**
•	PowerShell - Advanced Cmdlets	2	
•	PowerShell - Scripting and Features	1	
•	Variables Creating and Using variable and Getting information of variable	1	
•	PowerShell - Special Variables	2	
Module IV: Title:		**(6)**	**Lectures**
•	Introduction PowerShell – Operators and Arithmetic Operators	1	
•	Comparison Operators, Assignment and Logical Operators	1	

• Looping: for loop, forEach loop, while loop and do while loop • Conditions if and if else statement, nested if statement and switch statement • Array: Declaring Array Variables and Processing Arrays	1 2 2	
Module V: Title: • PowerShell - Hash tables Declaring hash table Variables Processing Hash table • Regex (Match Characters, Match Character Classes and Match Quantifiers) • PowerShell – Backtick • PowerShell –Brackets: Parenthesis brackets, Braces brackets and square brackets • PowerShell - Alias: Creating Alias and Getting Alias	**(6)** 2 1 1 1 1	**Assignment / Lectures**

ESSENTIAL READING	
1.	Thomas Lee .2017. **Windows Server 2016 Automation with PowerShell Cookbook - Second Edition: Automate manual administrative tasks with ease** 2nd Revised Edition

SUGGESTED READING	
1.	Chris Dent, Brenton J.W. Blawat 2017 **Mastering Windows PowerShell Scripting: One-stop guide to automating administrative tasks**, 2nd Edition 2nd Revised Edition
2.	Martin Machado, Prashant G Bhoyar **PowerShell for Office 365: Automate Office 365 administrative tasks Paperback** – July 26, 2017