RBU

RAMDEOBABA UNIVERSITY, NAGPUR

Formerly Shri Ramdeobaba College of Engineering & Management (RCOEM) Est. 1984

RAMDEOBABA UNIVERSITY

NAGPUR – 440013

Nagpur, Maharashtra (INDIA)

DEPARTMENT OF INFORMATION TECHNOLOGY AND SECURITY

PROGRAMME SCHEME
2024-25

B.TECH. INFORMATION TECHNOLOGY
B. TECH. CSE (CYBER SECURITY)

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester – I

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	ESC	24CS01TH0101	Fundamentals of Programming	3	0	3	50	50	100	3
2	ESC	24CS01PR0101	Fundamentals of Programming Lab	0	2	1	50	-	50	-
3	PCC	24EE01TH0107	Computer Architecture and Organization	3	0	3	50	50	100	3
4	VSEC	24CS01PR0103	Computer Workshop–I Lab	0	2	1	25	25	50	-
5	ESC	24CS01PR0104	Fundamentals of Linux OS	0	2	1	25	25	50	-
6	VEC	24CS01TH0105	Cyber Laws & Ethics in IT	2	0	2	50	50	100	2
7	BSC	24HS03TH0103	Probability and Statistics	3	0	3	50	50	100	3
8	BSC	24HS03PR0101	Computational Mathematics Lab for CSE	0	2	1	50	-	50	-
9	VEC	24HS02TH0104	Foundational Course in Universal Human Values	1	0	1	50	-	50	-
10	BSC	24HS05TH0102	Introduction to Quantum Computing	3	0	3	50	50	100	3
11	BSC	24HS05PR0102	Introduction to Quantum Computing	0	2	1	25	25	50	
TOTAL				**15**	**10**	**20**			**800**	

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester – II

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	ESC	24CS01TH0201	Object Oriented Programming	3	0	3	50	50	100	3
2	ESC	24CS01PR0201	Object Oriented Programming Lab	0	2	1	25	25	50	-
3	PCC	24CS01TH0202	Data Structures	3	2	3	50	50	100	3
4	PCC	24CS01PR0202	Data Structures Lab	0	2	1	25	25	50	-
5	VSEC	24CS01PR0203	Computer Workshop–II Lab	0	2	1	25	25	50	-
6	PCC	24CS01TH0204	Operating Systems	3	0	3	50	50	100	3
7	PCC	24CS01PR0204	Operating Systems Lab	0	2	1	25	25	50	
8	BSC	24HS03TH0214	Calculus and Linear Algebra	3	0	3	50	50	100	3
9	IKS	24HS02TH0203	Foundational Literature of Indian Civilization	1	0	1	50	-	50	-
10	BSC	24HS02PR0202	Professional Communication Lab	0	2	1	25	25	50	-
11	CCA	24HS04PR0201	Sports-Yoga-Recreation	0	2	1	25	25	50	-
12	VEC	24HS01TH0202	Environmental Science	1	0	1	50	-	50	-
13	VEC	24HS01PR0202	Environmental Science Lab	0	2	1	25	25	50	-
14	CCA	24HS02PR0206	Liberal/Performing Art	0	2	1	25	25	50	-
TOTAL				**14**	**18**	**22**	**-**	**-**	**900**	**-**

Liberal/ Performing Art Bucket

Sr. No.	Course Code	Course Title	L	T	P	Credits	Continuous Evaluation	End Sem Exam/ Internal Evaluation	Total	ESE Duration
1	24HS02PR0206-01	Fundamentals of Indian Classical Dance: Bharatnatayam	0	0	2	1	25	25	50	NA
2	24HS02PR0206-02	Fundamentals of Indian Classical Dance: Kathak	0	0	2	1	25	25	50	NA
3	24HS02PR0206-03	Introduction to Digital Photography	0	0	2	1	25	25	50	NA
4	24HS02PR0206-04	Introduction to Basic Japanese Language	0	0	2	1	25	25	50	NA
5	24HS02PR0206-05	Art of Theatre	0	0	2	1	25	25	50	NA
6	24HS02PR0206-06	Introduction to French Language	0	0	2	1	25	25	50	NA
7	24HS02PR0206-07	Introduction to Spanish Language	0	0	2	1	25	25	50	NA
8	24HS02PR0206-08	Art of Painting	0	0	2	1	25	25	50	NA
9	24HS02PR0206-09	Art of Drawing	0	0	2	1	25	25	50	NA
10	24HS02PR0206-10	Nature Camp	0	0	2	1	25	25	50	NA
11	24HS02PR0206-11	Developing Self-awareness	0	0	2	1	25	25	50	NA
12	24HS02PR0206-12	Art of Poetry	0	0	2	1	25	25	50	NA
13	24HS02PR0206-13	Creative and content writing	0	0	2	1	25	25	50	NA
14	24HS02PR0206-14	Science of life through Bhagwad Gita	0	0	2	1	25	25	50	NA
15	24HS02PR0105-15	Sanskrit Sambhashan Spoken Sanskrit	0	0	2	1	25	25	50	NA
16	24HS02PR0105-16	Kirtan Kala	0	0	2	1	25	25	50	NA
17	24HS04PR0202-1	Adventure Sports	0	0	2	1	25	25	50	NA
18	24HS04PR0202-2	Introduction to Defense Forces & Obstacle Training	0	0	2	1	25	25	50	NA
19	24HS04PR0202-3	Self Defense and Indian Martial Arts	0	0	2	1	25	25	50	NA
20	24HS04PR0202-4	Basic Nutritional Course	0	0	2	1	25	25	50	NA

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester – III

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0301/ 24CS08TH0301	Design and Analysis of Algorithms	3	0	3	50	50	100	03 Hrs
2	PCC	24CS10PR0301/ 24CS08PR0301	Design and Analysis of Algorithms Lab	0	2	1	25	25	50	-
3	PCC	24CS10TH0302/ 24CS08TH0302	Computer Networks	3	0	3	50	50	100	03 Hrs
4	PCC	24CS10PR0302/ 24CS08PR0302	Computer Networks Lab	0	2	1	25	25	50	-
5	PCC	24CS10TH0303/ 24CS08TH0303	Software Engineering	3	0	3	50	50	100	03 Hrs.
6	PCC	24CS10PR0303/ 24CS08PR0303	Software Engineering Lab	0	2	1	25	25	50	-
7	OE	24ID18TH0301	Open Elective -I	2	0	2	50	50	100	02 Hrs
8	MDM	24CS10TH0304/ 24CS08TH0304	MDM-I	3	0	3	50	50	100	03 Hrs
9	BSC	24HS03TH0301	Discrete Mathematics	3	0	3	50	50	100	03 Hrs
10	VSEC	24CS10PR0305/ 24CS08PR0305	Open-Source Technology Lab-I	0	2	1	25	25	50	-
11	CEP/FP	24CS10PR0306/ 24CS08PR0306	Community Engagement Project	0	4	2	25	25	50	-
TOTAL				**17**	**12**	**23**	**-**	**-**	**850**	**-**

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester - IV

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0401/ 24CS08TH0401	Theory of Computation	3	0	3	50	50	100	03 Hrs
2	PCC	24CS10TH0402/ 24CS08TH0402	Cryptography and Network Security	3	0	3	50	50	100	03 Hrs
3	PCC	24CS10PR0403/ 24CS08PR0403	Data Analytics Lab	0	2	1	25	25	50	-
4	PCC	24CS10TH0404/ 24CS08TH0404	Database Management System	3	0	3	50	50	100	03 Hrs
5	PCC	24CS10PR0404/ 24CS08PR0404	Database Management System Lab	0	2	1	25	25	50	-
6	PCC	24CS10TH0405/ 24CS08TH0405	Internet and Web Programming/ Fundamentals of Blockchain	3	0	3	50	50	100	03 Hrs
7	PCC	24CS10PR0405/ 24CS08PR0405	Internet and Web Programming Lab/ Fundamentals of Blockchain Lab	0	2	1	25	25	50	-
8	MDM	24CS10TH0406/ 24CS08TH0406	MDM-II	3	0	3	50	50	100	03 Hrs
9	OE	24ID18TH0401	Open Elective -II	2	0	2	50	50	100	02 Hrs
10	VEC	24CS10TH0407/ 24CS08TH0407	Creativity, Innovation & Design Thinking	2	0	2	50	-	50	-
11	PCC	24CS10PR0408/ 24CS08PR0408	Open-Source Technology Lab-II	0	2	1	25	25	50	-
TOTAL				**19**	**08**	**23**	**-**	**-**	**850**	**-**

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester – V

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0501/ 24CS08TH0501	Cloud Computing/ Basics of Ethical Hacking-I	3	0	3	50	50	100	03 Hrs
2	PCC	24CS10PR0501/ 24CS08PR0501	Cloud Computing Lab/ Basics of Ethical Hacking-I Lab	0	2	1	25	25	50	-
3	PCC	24CS10TH0502/ 24CS08TH0502	Artificial Intelligence/ Artificial Intelligence and Cyber Security	3	0	3	50	50	100	03 Hrs
4	PCC	24CS10PR0502/ 24CS08PR0502	Artificial Intelligence Lab/ Artificial Intelligence and Cyber Security Lab	0	2	1	25	25	50	-
5	PCC	24CS10TH0503/ 24CS08TH0503	Wireless Communication/ Computer Security	3	0	3	50	50	100	03 Hrs
6	AEC	24CS10TH0504/ 24CS08TH0504	Cognitive Skills	1	0	1	25	25	50	-
7	MDM	24CS10TH0505/ 24CS08TH0505	MDM-III	3	0	3	50	50	100	03 Hrs
8	OE	24ID18TH0501	Open Elective -III	2	0	2	50	50	100	02 Hrs
9	AEC	24CS10TH0506/ 24CS08TH0506	Basic Competitive Coding	0	2	1	50	-	50	-
10	HSSM-AEC	24	Business Communication	1	0	1	50	50	100	02 Hrs
11	HSSM-AEC		Business Communication Lab	0	2	1	25	25	50	-
12	PRJ	24CS10PR0507/ 24CS08PR0507	Project -I	0	2	1	50	50	100	-
TOTAL				**16**	**10**	**21**	**-**	**-**	**950**	**-**

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester - VI

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0601/ 24CS08TH0601	Machine Learning / Introduction to Cloud Security	3	0	3	50	50	100	03 Hrs
2	PCC	24CS10PR0601/ 24CS08PR0601	Machine Learning Lab/ Introduction to Cloud Security Lab	0	2	1	25	25	50	-
3	PCC	24CS10TH0602/ 24CS08TH0602	Internet of Things	3	0	3	50	50	100	03 Hrs
4	PCC	24CS10PR0602/ 24CS08PR0602	Internet of Things Lab	0	2	1	25	25	50	-
5	PCC	24CS10PR0603/ 24CS08PR0603	Mobile Apps Development/ Basics of Ethical Hacking-II	0	2	1	25	25	50	-
6	PCC	24CS10PR0604/ 24CS08PR0604	Network Defender Lab	0	2	1	25	25	50	-
7	PEC	24CS10TH0605/ 24CS08TH0605	Program Elective -I	3	0	3	50	50	100	03 Hrs
8	PEC	24CS10TH0606/ 24CS08TH0606	Program Elective -II	3	0	3	50	50	100	03 Hrs
9	MDM	24CS10TH0607/ 24CS08TH0607	MDM-IV	3	0	3	50	50	100	03 Hrs
10	PRJ	24CS10PR0608/ 24CS08PR0608	Project -II	0	4	2	50	50	100	-
TOTAL				**15**	**12**	**21**	**-**	**-**	**800**	**-**

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester – VII/VIII

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0701/ 24CS08TH0701	Image and Video Processing / Secure Coding	3	0	3	50	50	100	03 Hrs
2	PEC	24CS10TH0702/ 24CS08TH0702	Program Elective -III	3	0	3	50	50	100	03 Hrs
3	PEC	24CS10PR0702/ 24CS08PR0702	Program Elective -III Lab	0	2	1	25	25	50	-
4	PEC	24CS10TH0703/ 24CS08TH0703	Program Elective -IV	3	0	3	50	50	100	03 Hrs
5	PEC	24CS10PR0703/ 24CS08PR0703	Program Elective -IV Lab	0	2	1	25	25	50	-
6	PCC	24CS10TH0704/ 24CS08TH0704	Customer Relationship Management / Vulnerability Assessment and Penetration Testing	0	2	1	25	25	50	03 Hrs
7	PCC	24CS10PR0705/ 24CS08PR0705	Advanced Network Lab	1	2	2	25	25	50	-
8	HSSM-AEC		Organizational Behavior	2	0	2	50	50	100	02 Hrs
9	PRJ	24CS10PR0706/ 24CS08PR0706	Project -III	0	4	2	50	50	100	-
10	AEC	24CS10PR0707/ 24CS08PR0707	Advanced Competitive Coding	0	2	1	50	-	50	-
11	AEC	24CS10PR0708/ 24CS08PR0708	Participative Learning	0	2	1	50	-	50	-
12	Internship	24CS10PR0709/ 24CS08PR0709	Industry Internship Evaluation [Min 6 Weeks]	0	0	0	-	-	-	-
TOTAL				**12**	**16**	**20**	**-**	**-**	**800**	**-**

Teaching Scheme for B.Tech. Information Technology & CSE (Cyber Security) (2024-25)
Semester - VIII / VII

Sr. No.	Category	Course Code	Course Title	L	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	PCC	24CS10TH0801/ 24CS08TH0801	Cyber Physical Systems	3	0	3	50	50	100	03 Hrs
2	PCC	24CS10PR0801/ 24CS08PR0801	Cyber Physical Systems Lab	0	2	1	25	25	50	-
3	PEC	24CS10TH0802/ 24CS08TH0802	Program Elective -V / NPTEL/SWAYAM	3	0	3	50	50	100	03 Hrs
4	PEC	24CS10PR0802/ 24CS08PR0802	Program Elective -V Lab/ NPTEL/SWAYAM	0	2	1	25	25	50	-
5	PEC	24CS10TH0803/ 24CS08TH0803	Program Elective -VI / NPTEL/SWAYAM	3	0	3	50	50	100	03 Hrs
6	PEC	24CS10PR0803/ 24CS08PR0803	Program Elective -VI Lab / NPTEL/SWAYAM	0	2	1	25	25	50	-
TOTAL				**9**	**6**	**12**	**-**	**-**	**450**	**-**

OR

Sr. No.	Category	Course Title	L	T	P	C	Continuous Evaluation	ESE/ INT EVAL	Total	ESE Duration
1	Internship	Full Semester Internship/ * Research Internship / TBI	0	0	24	12	225	225	450	-
TOTAL			**0**	**0**	**24**	**12**	**-**	**-**	**450**	

Program Electives Basket

Micro Specialization	Elective-I (T) [VI Sem]	Elective-II (T) [VI Sem]	Elective-III (T+P) [VII Sem]	Elective-IV (T+P) [VII Sem]	Elective-V (T+P) [VIII Sem]	Elective-VI (T+P) [VIII Sem]
AIML	Information Retrieval	Computer Vision	Robotics and Automation	Deep Learning	Natural Language Processing	Generative -AI
Security	Incident Handling and Response	Application Security	Auditing IT Infrastructure for Compliance	Digital Forensic	Cyber Risk Assessment & Management	Security Information Event Management
General	Product and Project Management	Bioinformatics	AI & ML on Public Cloud Platform	Data Warehousing & Mining	Human Computer Interface	Blockchain Technology

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0301/24CS08TH0301			
Category	Program Core Course (PCC)			
Course Title	Design and Analysis of Algorithms			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	III

Course Outcomes

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

1. Justify the fundamental needs of algorithms and the reason for their analysis
2. Exhibit knowledge of standard algorithm design techniques
3. Apply different algorithm design techniques for problem-solving
4. Analyze the time and space complexity of various algorithms
5. Design efficient algorithms for various computing problems

Unit I

Mathematical foundations, Summation of arithmetic and geometric series, asymptotic notations for analysis of algorithms, Recurrence relations, Amortized analysis and application. Review of Basic Tree and Graph Traversals and Search Techniques

Unit II

Divide and Conquer: Basic strategy. Case studies of Binary Search, Quick sort, Merge sort and Matrix operations. Other applications.
Greedy Method: Basic strategy, Case studies of Job Sequencing problem, Minimum Cost Spanning Trees and Single Source Shortest path

Unit III

Dynamic Programming: Basic strategy. Concept of Multistage Graphs. Case studies of Al Pairs Shortest Path Algorithm, Optimal Binary Search Trees, Traveling Salesman Problem, Longest Common Subsequence Problem and its variations. Other applications

Unit IV

Backtracking: Basic strategy. Case studies of n-Queen's problem, Graph Coloring Problem, Hamiltonian Cycles. Other applications

Unit V

Non-deterministic algorithms, NP-hard and NP-complete problems, Decision and Optimization problems, Graph based problems on NP Principle. Introduction to Approximation algorithms.

Text Books

1. Introduction to Algorithms: Thomas H. Cormen et.al, MIT Press, Fourth Edition
2. Fundamentals of Computer Algorithms: Horowitz, Sahani, Rajsekharam, Computer Science Press, Second Edition
3. Fundamentals of Algorithms: Brassard, Bratley, First Edition, Prentice Hall, India

Reference Books

1. The Design and Analysis of Algorithms: Dexter C. Kozen, Springer, First Edition.
2. Foundations of Algorithms: Dr. S. R. Sathe, Penram Publications, First Edition.

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0301/24CS08PR0301			
Category	Program Core Course			
Course Title	Design and Analysis of Algorithms Lab			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	III

Course outcomes:

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

1. Demonstrate knowledge of different programming paradigms
2. Derive the Time Complexity of the given Algorithms
3. Apply an appropriate programming paradigm to solve the problems

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0302/24CS08TH0302			
Category	Program Core Course			
Course Title	Computer Networks			
Scheme& Credits	L	P	Credits	Semester
	3	0	3	III

Course Outcomes:

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

1. Demonstrate the knowledge of layered architecture for networking.
2. Understand the design issues at different layers in network architecture.
3. Exhibit knowledge of IP addressing and standard network services.
4. Apply the algorithms at different layers to solve problems.
5. Analyze the protocols with respect to their performance at different layers.

Unit I

Introduction: Network hardware, Network software, Protocol hierarchies, Design issues for layers. The ISO-OSI reference model, TCP/IP model. Physical Layer: Issues, Transmission Impairments, Data Rate Limits, Performance. Bandwidth Utilization: Multiplexing, Transmission Media: Guided and Unguided.

Unit II

Data Link Layer - Design issues, Services, Error Detection and Correction, Data Link Control, Elementary Data Link Layer protocols. Medium Access Sub Layer: Multiple Access Protocols, IEEE standards: Ethernet (802.3), Wireless LAN (802.11).

Unit III

Network Layer: Design issues, Comparison of Virtual Circuit and Datagram subnets, Routing algorithms, Congestion control algorithms, Congestion control in Virtual Circuit subnets.

Unit IV

IPv4 Addressing: Datagram forwarding in IP4, Subnetting, CIDR Notation. Address Translation (ARP), Host Configuration (DHCP), Error Reporting (ICMP), Introduction to IPv6.

Unit V

Transport and Application layers: Services, Addressing, Establishing and releasing a connection, Flow control/buffering, Multiplexing and Crash recovery. Congestion control and Quality of Service. Introduction to UDP and TCP. Application Layer: Domain Name Space (DNS), MAIL server, File Transfer Protocol (FTP)

Text Books

1. Computer Networks: Andrew Tanenbaum, 6th Edition, PHI.
2. Data Communication and Networking: Behrouz Forouzan, 6th Edition, TMH.

Reference Books

1. Introduction to Data Communications and Networking: Wayne Tomasi, 1st Edition, Pearson Education.
2. Computer Networks: A Systems Approach: Larry. L. Peterson, Bruce. S. Davie, 6th Edition, Morgan Kaufmann Publishers.
3. Computer Networks and Internet: Douglas Comer, 6th Edition, PHI.

Course Code	24CS10PR0302/24CS08PR0302			
Category	Professional Core Course			
Course Title	Computer Networks Lab			
Scheme& Credits	L	P	Credits	Semester
	0	2	1	III

Course Outcomes

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

1. Demonstrate the functionality of various software and hardware components of networking
2. Implement the layered functionalities at different layers
3. Configure various Network devices
4. Design and evaluate Network performance

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0303/ 24CS08TH0303			
Category	Program Core Course			
Course Title	Software Engineering			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	III

Course Outcomes:

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

1. Demonstrate knowledge of various Software Development Process Models
2. Analyse various Project Estimation techniques and Risk Strategies for software project development
3. Design various components of software using UML Modelling
4. Apply the knowledge of Software Design Fundamentals for software building
5. Analyse Quality Assurance parameters and Software Testing Strategies

Unit I

Introduction to Software Engineering, Software Myths, Software Engineering-A Layered Technology, Software Process Framework, Software Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Model: Extreme Programming (XP), Adaptive Software Development (ASD), Scrum, Dynamic System Development Method (DSDM), Case Studies

Unit II

Requirement Analysis, Software Requirements Specification: Functional, Non-Functional Requirements, User requirements, System requirements. Software Project Management- Process Metrics, Software Measurement, Project Evaluation and Estimation Techniques: Decomposition Techniques, LOC-based Estimation, Function Point-based Estimation, Cost Estimation, Project Scheduling, Risk Management.

Unit III

Unified Modelling Language diagrams for designing using StarUML: Use Case Diagram, Activity diagram, Data Flow Diagram, Entity Relationship (ER) Diagram, Class Diagram and their usage, Case studies

Unit IV

Quality Management - Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Review, Statistical Software Quality Assurance, Software Reliability, Change Management - Software Configuration Management, SCM Repository, SCM Process

Unit V

Software Design and Testing: Design Concepts, Effective Modular Design, User Interface Design, Dashboard designing, guidelines and standards, Software Testing Techniques

Text Books

1. Software Engineering: Kassem A. Saleh, India Edition, Cengage Learning 1st Edition
2. Software Engineering, Principles and Practices: Rajesh Narang, MG
3. Ian Somerville; Software Engineering; Seventh Edition; Pearson Education. 2008

Reference Books

1. Software Engineering: Kassem A. Saleh, India Edition, Cengage Learning
2. Software Engineering: Schach, Special Indian Edition, TMH.
3. David Gustafsan, Software Engineering; Schaum's Series, Tata McGraw Hill
4. Rajib Mall, Software Project Management, 5th Edition, McGrawHill

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0303/ 24CS08PR0303			
Category	Program Core Course			
Course Title	Software Engineering Lab			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	III

Course Outcomes:

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

1. Use appropriate Software Development Process Models
2. Apply different Project Estimation techniques for software project development.
3. Design UML diagrams using the tool.
4. Apply different Software Testing Strategies

Syllabus for B. Tech. III Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0305/ 24CS08PR0305			
Category	Vocational and Skill Enhancements Course (VSEC)			
Course Title	Open-Source Technology Lab-I			
Scheme& Credits	L	P	Credits	Semester
	3	2	1	III

Course Outcomes:

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

1. Understand the principles behind open-source software
2. Exhibit knowledge of various open-source software tools
3. Understand the process of contributing to open-source projects
4. Demonstrate various software development methodologies within open-source environments

Office Suites:
LibreOffice: A powerful office suite compatible with Microsoft Office formats.
Calligra Suite: An integrated office suite with tools for word processing, spreadsheets, and presentations.

Graphics and Design:
Canva: Online design platform for posters, presentations, and social media.
Tinkercad: Online 3D design and circuit simulation tool by Autodesk.

Security and Privacy:
KeePassXC: Cross-platform password manager that stores passwords securely

E-commerce:
Magento: Open-source e-commerce platform for building online stores
Development & Version Control:
Git & GitHub – Version control and collaboration for software development.

Data Analysis and Visualization:
Tableau: Industry-standard data visualization tool for building dashboards and analysing structured datasets.

Midjouney:
AI image generator enabling users to transform their textual prompts into visually striking images.

Introduction to Python Programming:
Overview of Python , Installation and setup , Variables, data types, and operators ,Control flow: loops and conditional statements ,List , Tuple , Dictionary , Functions and modules
.

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0401/ 24CS08TH0401			
Category	Program Core Course			
Course Title	Theory of Computation			
Scheme& Credits	L	P	Credits	Semester
	3	0	3	IV

Course Outcomes

At the end of the course, students will be able to

1. Construct the grammar for various models
2. Apply various automata for problem solving
3. Apply the recursive theory for problem solving
4. Analyze the complexity of the given problem

Unit I

Introduction: Strings, Alphabet, Language, Operations, Finite state machine, Definitions, Finite automation model (FA), Acceptance of strings and languages, Non-deterministic finite automation, Deterministic finite automation, Equivalence between NFA & DFA, Conversion of NFA into DFA, Minimization of FSM, Equivalence between two FSM's, Two Way finite automata, Myhill-Nerode Minimization theorem, Moore and Mealy machines.

Unit II

Regular Expressions: Regular sets, Regular expressions (RE), Identity rules, Manipulation of regular expressions, Equivalence between RE and FA, Pumping lemma, Closure properties of regular sets, Regular grammars (RG), Right linear and Left linear grammars, Equivalence between regular linear grammar and FA, Interconversion between RE and RG.

Unit III

Grammars: Context-free grammar, Derivation trees, Chomsky normal form, Greibach normal form, Push down Automata, Definition, Model, Acceptance of CFL, Equivalence of CFL & PDA, Interconversion, Enumeration of properties of CFL.

Unit IV

Push down automata (PDA): Non determinism, acceptance by two methods and their equivalence between PDA and CFG, closure and decision properties of CFLs.

Unit V

Turing machine: variants, recursively enumerable set; recursive sets TM as a computer function, decidability and solvability, Halting Problem, Post correspondence Problems (PCP) and unsolvability of ambiguity problem of CFGs, Church's hypothesis.

Computable Functions: Partial, Total, Constant Functions, Primitive Recursive Functions, Bounded Normalization, Regular Function, Recursive Functions.

Text Books

1. An Introduction to Formal Languages and Automata: Peter Linz, Narosa Pub.
2. Theory of Computer Science: K. L. P. Mishra and N. Chandrasekaran, PHI.
3. Theory of Computation: Michael Sipser, Cengage Learning.

Reference Books

1. Introduction to Languages and the Theory of Automata: John C. Martin, McGraw Hill
2. Introduction to Automata Theory, Languages and Computation: J. E. Hopcroft, Rajeev Motwani, Pearson Education

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0402/24CS08TH0402			
Category	Professional Core Course			
Course Title	Cryptography and Network Security			
Scheme& Credits	L	P	Credits	Semester
	3	0	3	IV

Course Outcomes

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

1. Understand different attacks and its counter measures.
2. Apply knowledge of Mathematics required for cryptography.
3. Apply security services for providing information security.
4. Analyse various standard security protocols.

Unit I

Types of Attacks and Software Vulnerabilities, System Security: Buffer overflow and malicious software, Intrusion detection system, Firewalls. Mathematics of Cryptography.

Unit II

Classical Ciphers, Modern Block ciphers: DES, Triple DES, Blowfish, AES. Block cipher modes of operation, Asymmetric key ciphers: RSA.

Unit III

Message Integrity and Authentication: Requirements of Hash functions and MAC, Algorithms: MD5, SHA-1, Whirlpool, HMAC.
Digital Signatures: Algorithms: RSA, DSS, Attacks, variations and applications.

Unit IV

Key Management: Symmetric key distribution, Symmetric key agreement, Public key distribution.
Entity Authentication: Password based, Challenge Response protocols, Zero knowledge protocols, Biometrics.

Unit V

Security protocols at Application layer: PGP, SET, Kerberos
Security protocol at Network layer: IPSec
Security protocol at Transport layer: SSL and TLS

Text Books

1. Cryptography & Network Security: Behrouz A. Forouzan, Debdeep Mukhopadhyay, MGH.
2. Cryptography & Networks Security Principles & Practice: William Stallings, Pearson Education.

Reference Books

1. Network Security and Cryptography: Bernard Menezes, 1st Edition, Cengage Learning.

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0403/ 24CS08PR0403			
Category	Program Core Course			
Course Title	Data Analytics Lab			
Scheme& Credits	L	P	Credits	Semester
	0	2	1	IV

Course Outcomes:

On completion of the course the student will be able to

1. Understand and apply different data preprocessing techniques.
2. Examine descriptive statistics of given data.
3. Apply appropriate data visualization technique(s).

Programming assignments using following :

- Numpy and pandas in Python
- Data preprocessing techniques
- Measures of central tendency
- Measures of dispersion
- Sampling and probability distributions
- Hypothesis testing
- Data visualization techniques

Reference Books :

1. "Fundamentals of Data Analytics", O'Reilly.
2. Kyran Dale, "Data Visualization with Python and JavaScript – Scrape, Clean and transform Your Data", O'Reilly.

Course Code	24CS10TH0404/ 24CS08TH0404			
Category	Program Core Course (PCC)			
Course Title	Database Management System			
Scheme & Credits	L	P	Credits	Semester
	3	0	3	IV

Course Outcomes:

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

1. Exhibit knowledge of Data models and DBMS architectures
2. Apply query processing
3. Apply various concurrency and recovery techniques
4. Design database system for various applications

Unit I

Introduction to database systems: Overview, File systems Vs DBMS, Various data models, Levels of abstraction, Structures of DBMS, Relational model, Relations and Integrity constraints, Relational algebra, SQL

Unit II

Database design: Overview of database design, ER model, Features of ER model, Conceptual design using ER model, Scheme refinement and normal forms, Scheme refinement, Use of decompositions, Functional dependencies, Multi-valued dependencies

Unit III

Query optimization and evaluation: Introduction to query processing, Selection operation, Projection operation, Join operation, Set operation, and Aggregate operation, Relational query optimization, Translating SQL queries, estimating the cost, Relational algebra equivalence

Unit IV

Concurrency control and recovery: Concepts of transaction, Transactions and schedules, Lock-based concurrency control, Lock management, specialized locking techniques, Concurrency control without locking, Crash recovery, Introduction to crash recovery, Log recovery, Check pointing.

Unit V

NoSQL Databases: Introduction, Differences from Relational Databases, Basic Schema and Data Types, Types of NoSQL Databases. Implementing a Document Database, Column Family Database, and Graph Database

Text Books

1. Database Systems Concepts: Silberschatz, Korth, Sudarshan, McGraw-Hill , Seventh Edititon
2. Database Management Systems by RamaKrishna & Gehrke, 3rd Edition, 2018, McGraw-Hill

Education Reference Books

1. Fundamentals of Database Systems: R. Elmasri, S.B. Navathe, Pearson Education, 6th Edition
2. Seven Databases in seven weeks: a guide to modern databases and the NoSQL movement. Perkins, L., Redmond, E., & Wilson, J. (2018). Pragmatic Bookshelf
3. Big Data and Analytics', Wiley India, Seema Acharya, Subhashini Chellappan Second Edition

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0404/ 24CS08PR0404			
Category	Program Core Course (PCC)			
Course Title	Database Management System Lab			
Scheme & Credits	L	P	Credits	Semester
	0	2	1	IV

Course Outcomes:

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

1. Apply DDL, DML, and DCL commands
2. Apply various functions and clauses in SQL
3. Use PL/SQL for database operations
4. Create database using NOSQL

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10TH0405			
Category	Program Core Course (PCC)			
Course Title	Internet and Web Programming			
Scheme& Credits	L	P	Credits	Semester
	3	0	3	IV

Course Outcomes:

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

1 . Understand the fundamental concepts of the Internet, Web architecture, and protocols.

2 . Design structured and responsive web pages using HTML and CSS.

3. Implement interactive features on web pages using JavaScript and client-side scripting.

4 . Develop dynamic web applications using server-side programming and database integration.

5 . Use modern tools and frameworks for efficient web development and deployment.

Unit I: Introduction to Internet and Web Technologies
Evolution of Internet and World Wide Web ,Internet protocols: HTTP, HTTPS, FTP, TCP/IP, DNS Domain Names, Hosting, and Web Servers ,Introduction to Web Browsers and Search Engines,Web Architecture: Client-Server, 2-tier, 3-tier, n-tier architectures

Unit II: HTML and CSS
Structure of HTML5 Document , Elements, Attributes, Forms, Tables, Multimedia Elements , Introduction to CSS: Inline, Internal, External CSS , CSS3 Features: Box Model, Flexbox, Grid, Media Queries , Responsive Web Design using CSS

Unit III: Client-Side Scripting with JavaScript
JavaScript Basics: Syntax, Variables, Data Types, Operators , Control Structures, Functions, Arrays, Objects , DOM Manipulation and Event Handling , Form Validation Techniques ,Introduction to ES6 Features

Unit IV: Server-Side Programming
Introduction to Web Servers (Apache, Nginx) ,Basics of PHP or Node.js (choose per curriculum needs) , Handling Form Data, File Uploads ,Working with Sessions and Cookies ,Error Handling and Security Basics

Unit V: Database Integration and Web Development Tools
MySQL or MongoDB Basics (Tables/Collections, CRUD operations) ,Connecting Web Applications to Databases , Introduction to AJAX and JSON ,Using Web Development Tools: VS Code, Git, Browser DevTools , Introduction to Frontend Frameworks (e.g., Bootstrap) and Backend (e.g., Express.js)

Textbooks:

1. Achyut Godbole and Atul Kahate, *Web Technologies*, McGraw Hill
2. Robin Nixon, *Learning PHP, MySQL & JavaScript*, O'Reilly

References:

1. Jon Duckett, *HTML & CSS: Design and Build Websites*, Wiley

Course Code	24CS10PR0405			
Category	Program Core Course (PCC)			
Course Title	Internet and Web Programming Lab			
Scheme& Credits	L	P	Credits	Semester
	0	2	2	IV

Course Outcomes:

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

1. Design and build responsive web interfaces using HTML5 and CSS3.
2. Apply JavaScript for client-side programming and DOM manipulation.
3. Develop server-side components using PHP/Node.js and interact with databases.
4. Demonstrate full-stack development through mini projects and lab assignments.
5. Use web development tools and version control systems effectively.

List of Sample Practicals:

1. Create a personal webpage using HTML5 and CSS.
2. Design a responsive layout using Flexbox and Media Queries.
3. Develop a web form with JavaScript validation.
4. Create a dynamic web page that manipulates DOM elements.
5. Develop a login form using PHP/Node.js and validate user credentials.
6. Store and retrieve data using MySQL or MongoDB.
7. Implement session management in a web application.
8. Create a mini project (e.g., blog, student portal, or e-commerce product page).

Course Code	24CS10PR0407/24CS08PR0407			
Category	Vocational and Skill Enhancements Course (VSEC)			
Course Title	Creativity, Innovation & Design Thinking			
Scheme& Credits	L	P	Credits	Semester
	2	0	2	IV

Course Outcomes:

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

1. Understand how to adapt to constantly evolving new technologies with a strong critical thinking principle.
2. Foster outside-the-box thinking for innovative ideas.
3. Develop collaboration, communication, and articulation skills.
4. Practical implementation of the Design thinking principle to solve real-world challenges via technology.
5. Enhance research and data analyzing skills for problem solving.

Unit1: Introduction to Critical Thinking and Design Thinking

- **Lecture:**
  - What is critical thinking? Importance in engineering.
  - How to define a clear and actionable problem statement.
  - Introduction to design thinking: Empathy, Define, Ideate, Prototype, Test.
- **Activities:**
  - Case studies on successful applications of design thinking.
  - Group discussions on the importance of critical thinking in engineering.
  - Roleplay activity based one case studies.

Unit2: Empathy & Define

- **Lecture:**
  - Importance of empathy in design thinking.
  - Techniques for understanding user needs (interviews, observations, surveys).
  - How to define a clear and actionable problem statement.
  - The role of critical thinking in problem definition.
- **Activities:**
  - Activity: Students interview users or stakeholders.
  - Create empathy maps based on user insights.
  - Group work: Define problem statements from gathered user data.
  - Peer review and critique of problem statements.

Unit3: Ideate & Prototyping

- **Lecture:**
  - Techniques for brainstorming and generating creative ideas.
  - Overcoming cognitive biases and thinking outside the box.
  - Importance of prototyping in design thinking.
  - Different types of prototypes (low-fidelity vs. high-fidelity).
  - Methods for testing prototypes and gathering user feedback.

- Iteration based on testing results.
-

- **Activities:**
  - Ideation sessions using different techniques (brainwriting, SCAMPER).
  - Group presentation of ideas and receiving feedback.
  - Hands-on workshop: Building prototypes using simple materials.
  - Testing prototypes within groups and gathering feedback.
  - Analyze feedback and iterate on the design.
  - Case studies of real-world engineering problems solved using these approaches.

Unit4 : Research Methodologies , Data Presentation and Visualization

- **Lecture:**
  - Research design and methodology.
  - Data interpretation and analysis techniques.
  - Techniques for effective data presentation.
  - Data visualization best practices.
- **Activities:**
  - Designing and conducting a mini-research project.
  - Analysing research findings and preparing reports.
  - Presenting research findings and data analysis results to the class.

Unit5: Collaboration and Communication

- **Lecture:**
  - Importance of teamwork and effective communication in engineering.
  - Techniques for effective communication.
  - Integrating critical thinking and design thinking in professional practice.
- **Activities:**
  - Group projects: Collaborative problem-solving tasks.
  - Role-playing exercises to improve communication skills.
  - Capstone project: Students work in teams to solve a problem using design thinking.
  - Presentations and demonstrations of final projects.

Unit6: Reflection and Assessment

- **Lecture:**
  - Reflecting on the learning journey.
  - Assessing the development of critical thinking and design thinking skills.
- **Activities:**
  - Individual reflections: Students write about their experiences and learning outcomes.
  - Peer and instructor feedback on the capstone projects.

Textbook:

1. Design Thinking by Hasso Plattner, Christoph Meinel, Larry Leifer

Reference Books:

1.The Seven Habits of Highly Effective People, by Stephen R. Covey
2.Creative Problem Solving for Managers - Tony Proctor - Routledge Taylor & Francis Group

Syllabus for B. Tech. IV Semester Information Technology & CSE (Cyber Security)

Course Code	24CS10PR0408/24CS08PR0408			
Category	Program Core Course			
Course Title	Open-Source Technology Lab-II			
Scheme& Credits	L	P	Credits	Semester
	0	2	1	IV

Course Outcomes:

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

1. Understand the philosophy and ecosystem of open-source software.

2. Gain hands-on experience with a variety of open-source tools in domains such as system utilities, data analysis, communication, and development.

3. Learn how to explore, deploy, and contribute to open-source projects

4. Integrate open-source software tools into real-world use cases and projects.

Graphics and Design:
Blender: Open-source 3D creation software, useful for animation, modelling, and more.
GIMP: GNU Image Manipulation Program, a powerful image editor.

Education:
Mentimeter: Open-source system for creating online quiz.
Moodle: Open-source learning management system for creating online courses.

Productivity and Collaboration:
Nextcloud: A self-hosted productivity platform for file sharing, communication, and more.
Zulip: Open-source team chat software with threaded conversations.
Taiga: Project management platform for agile developers and designers.

System Utilities and Collaboration:
Glances: Cross-platform monitoring tool for real-time system statistics.
BleachBit: System cleaner to free disk space and maintain privacy

Content Management Systems (CMS):
WordPress: Open-source CMS for creating websites and blogs
Joomla: Another popular CMS for publishing web content

Security and Privacy:
Wireshark: Network protocol analyzer used for troubleshooting and analysis.
OpenVPN: Open-source software for creating VPN (Virtual Private Network)

connections.

Content Creation:
OBS Studio: Software for video recording and live streaming.
Xerte: Toolkit for authoring interactive e-learning content

Data Science and Visualization:
KNIME: Data analytics platform for data mining and machine learning.