

B. E. Computer Science and Business Systems
Scheme & Syllabus for III Year:Academic Year: 2024-2025
Sixth Semester

Course Code	Course Title	L-T-P	Credit	Hours
22CB601	Information Security and Cyber Law	3-0-0	3	03
22CB602	Software Engineering	2-0-2	3	04
22CB603	Data Mining And Data Warehousing	3-0-0	3	03
22CB651	Block Chain Technology (Professional Elective Course- II)	3-0-0	3	03
22OECB6X	Open Elective Course- I	3-0-0	3	03
22CB606	Major Project Phase - I	0-0-4	2	02
22CB657	Mobile Application Development Laboratory	0-0-2	1	02
23CB658D	Business Communication (Ability Enhancement Course/Skill Enhancement Course-III)	0-0-2	1	02
22SW01	Swayam (Mandatory Audit Course) NPTEL	0-1-0	A	-
22ASK	Analytical ability & Soft skills	0-0-2	1	02
Total			20	24

Course Title	INFORMATION SECURITY AND CYBER LAW		
Course Code	22CB601	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
SEE	50 Marks	Total Hours	40
Course Objective: Students will be able to apply cryptography techniques on malicious networks and cyber law, IPR, IT Act.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
No.	Course Outcomes	POs	PSOs
1	Perceive the various types of Security attacks and Ciphers	PO1,PO12	-
2	Develop the Traditional and Modern Block Ciphers	PO3	-
3	Analyze the Symmetric and Asymmetric key Cryptography Algorithms	PO2	-
4	Assess the new strategies and regulations of Cyber law and IT act	PO6,PO8	-
Course Contents:			
Module 1			10 Hours
Introduction: Security goals, Cryptographic attacks, Services and Mechanisms, Techniques for security goals implementation, Mathematics of cryptography: Integer Arithmetic, The Extended Euclidean Algorithm; Traditional Symmetric-Key Ciphers: Symmetric-Key Ciphers, Categories of traditional ciphers.			
Module 2			10 Hours
Stream and Block ciphers; Introduction to Modern Symmetric-Key Ciphers: Modern block ciphers, Components of modern block ciphers, Two classes of Product Ciphers, Attacks designed for block ciphers.; Data Encryption Standard: History and Data Encryption Standard, DES Structure, DES Analysis, Security of DES, Multiple DES-Conventional Encryption Algorithm.			
Module 3			10 Hours
The CAST Block Cipher, Data Encryption Standard Blowfish, IDEA; Advanced Encryption Algorithm: History and Advanced Encryption Algorithm, Transformation used by AES; Asymmetric Key cryptography: Difference between symmetric cryptography and asymmetric Key cryptography Cryptosystem, RSA cryptosystem, Rabin Cryptosystem ;			
Module 4			10 Hours
Security and Cyber Law: Cyberspace , Cyber security, Cyber security Policy, Cyber Crime, Nature of Threat , Enabling People, Mission and Vision of Cyber security Program, OBJECTIVES : Emerging Trends of Cyber Law, Create Awareness, Areas of Development, International Network on Cyber security; Intellectual Property in Cyber Space; The information Technology Act - IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Digital Signature certificates, Duties of Subscribers, Penalties and adjudication.			
Self Study: Intellectual Property Rights: Types of Intellectual Property Rights, Advantages of Intellectual; Property Rights, Intellectual Property Rights in India with respect to Cyber laws. Mathematics of Asymmetric-Key cryptography: Primes, Primality testing, Factorization, Chinese Remainder Theorem.			
Text Books: 1. Behrouz A Forouzan, Debdeep Mukhopadhyay, “Cryptography and Network Security” Third edition published by McGraw Hill Education-2017. 2. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition			

Reference Books:

1. Hans Delfs, Helmut Knebl, "Introduction to Cryptography: Principles and Applications", Springer
2. Neal Koblitz, "Number theory and cryptography", Springer, 2007.
3. William Stallings: Cryptography and Network Security, Fifth Edition, Pearson Education-2013

MOOCs:

1. <http://nptel.ac.in/courses/106105031/>
2. <https://www.edx.org/learn/cybersecurit>
3. https://www.tutorialspoint.com/information_security_cyber_law/index.htm

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COs														
CO1	3													2
CO2			3											
CO3		3												
CO4						3		2						

Course Title	SOFTWARE ENGINEERING		
Course Code	22CB602	L-T-P-C	(2-0-2)3
Exam Hrs.	3	Hours / Week	3
SEE	50 Marks	Total Hours	30T +10L
Course Objective: Students able to acquire knowledge of working mechanisms of different types of Networks, Address Mechanisms and Protocols. Course Outcomes (Cos): Upon completion of the course, students shall be able to:			
No.	Course Outcomes	POS	PSOs
1.	Design a software system, component, or process to meet desired needs within realistic constraints.	1	-
2.	Assess professional and ethical responsibility and Function on multi-disciplinary teams	6,7	-
3.	Use the techniques, skills, and modern engineering tools necessary for engineering practice	3,5	1
4.	Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems	5,8,9, 10	1
Course Contents:			
Module 1			8 Hours
Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. Software Processes: Models: Waterfall Model, Incremental Model and Spiral Model, Process activities. Requirements Engineering: Requirements Engineering Processes. Requirements Elicitation and Analysis, Functional and non-functional requirements. The software Requirements Document, Requirements Specification, Requirements validation, Requirements Management.			
Module 2			8 Hours
System Models: Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering. Design and Implementation: Introduction to RUP, Design Principles, Object-oriented design using the UML, Design patterns, Implementation issues, Open source development Software Testing: Development testing, Test-driven development, Release testing, User testing, Test Automation.			
Module 3			7 Hours
Software Evolution: Evolution processes, Program evolution dynamics, Software maintenance, Legacy system management Project management: Risk management, Managing People, Teamwork. Project Planning: Software pricing, Plan-driven development, Project scheduling: Estimation techniques, Quality management: Software quality, Reviews and inspections, Software measurement and metrics, Software standards Risk management, Managing People, Teamwork.			
Module 4			7 Hours
Agile Software Development: Coping with Change, The Agile Manifesto: Values and Principles. Agile methods: SCRUM and Extreme Programming. Plan-driven and agile development. Agile project management, Scaling agile methods			

Self Study:

DevOps Practices and Principles, Microservices Architecture, Continuous Integration and Continuous Deployment (CI/CD), Software Configuration Management, Cybersecurity in Software Development, User Experience (UX) Design, Human-Computer Interaction (HCI), Cloud-Based Software Development, Mobile Application Development, Software Documentation Best Practices.

Lab components 10 Hours

1. Case study to understand the SDLC on video doorbell
2. Create JIRA (similar tool) account and learn interface
3. Organize role play for requirement activities for Zomato and Identify problem and prepare requirement document or Epics and user stories.
4. Configure JIRA for managing the project to solve the identified problem.
5. Draw UML diagram for given use case using Draw.io tool
6. Create Git(Similar tool) account and configure repository
7. Create Sitemap and Wireframe for the user stories. (Using Figma tool)

Text Books:

- Software Engineering by Ian Sommerville, Pearson Education, 9th Edition, 2012

Reference Books:

- Software Engineering – A Practitioners approach by Rogers S. Pressman, Tata McGraw Hill, 7th Edition.
- An Integrated Approach to Software Engineering by Pankaj Jalote, Wiley India

Course Articulation Matrix

Course Outcomes	Program Outcomes [POs]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COs														
CO1	2													
CO2						2	2							
CO3			2		2								2	
CO4													2	
					3			1	1	1				

Course Title	DATA MINING AND DATA WAREHOUSING		
Course Code	22CB603	L-T-P	(3-0-0)3
Exam	3Hrs.	Hours/Week	3
SEE	50Marks	Total Hours	40
Course Objective: Students will be able to select appropriate data mining techniques to extract useful patterns.			
Course Outcomes: At the end of course, student will be able to:			
No.	Course Outcomes	POs	PSOs
1	Describe the data quality and data pre-processing techniques	1	-
2	Apply data mining algorithm for, Classification, Association and cluster Analysis	3	-
3	Describe the design of Data Warehouse, Modelling and usage	1	-
4	apply classification, frequent pattern mining, and clustering techniques to discover meaningful patterns and trends in large datasets.	2	1
MODULE-1			10Hrs.
Introduction: Data: Why Data Mining? What is Data Mining? What kinds of data can be mined?, What kinds of pattern can be mined?, Which technologies are used? Major issues in data mining.			
Getting to know the data: Data objects and attribute types, Basic statistical description of data: measuring the central tendency, Measuring the dispersion of data, measuring data similarity and dissimilarity.			
MODULE-2			10Hrs.
Data Pre-processing: An overview, Data cleaning, Data integration, Data Reduction: overview of data reduction strategies, wavelet transforms, Principal component analysis, attributes subset selection, Data Transformation: min-max normalization and Z-score normalization.			
Data Warehouse and online Analytical processing: Data Warehouse: Basic Concepts ,Data Warehouse modelling : Data cube and OLAP , Data warehouse design and usage: A business analysis frame work for data warehouse design, Data warehouse design process, Data warehouse usage for information processing.			
MODULE-3			10Hrs.
Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Rule-based classification, K- Nearest-neighbour Classifier. Mining frequent patterns			
Association and correlations: Basic Concepts and Methods: Basic Concepts, Frequent item set mining methods: Apriori Algorithm, generating association rules from frequent item sets, Improving the efficiency of Apriori, A Pattern growth Approach for Mining Frequent item sets.			
MODULE-4			10Hrs.
Cluster Analysis: Basic Concepts and Methods, Cluster Analysis, Partitioning Methods, Agglomerative versus divisive hierarchical clustering, DBSCAN.			
Data Mining Trends and research frontiers: Data Mining Applications , Data mining and society, Data mining trends.			
Self-Study:			
Real-Time Data Mining, Privacy-Preserving Data Mining, Web Mining, Social Network Analysis, Anomaly Detection in Data Mining, Temporal and Spatial Data Mining, Text and Sentiment Analysis, Graph Data Mining, Big Data Analytics, Ethical Considerations in Data Mining, Reinforcement Learning in Data Mining, Scalable Data Mining Algorithms, Data Mining with Cloud Computing, Deep Learning for Data Mining, Data Mining for Cybersecurity.			

Textbooks:

1. Jiawei Han and Micheline Kamber: Data Mining – Concepts and Techniques, 4th Edition, Morgan Kaufmann, 2018.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education, 2020.

Reference Book:

1. K.P. Soman, Shyam Diwakar, V. Ajay, Insight into Data Mining–Theory and Practice, PHI, 2006.

Course Articulation Matrix

COs	Program Outcomes [POs]													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2			2											
CO3	3												2	
CO4		2												

Course Title	BLOCK CHAIN TECHNOLOGY		
Course Code	22CB651	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
SEE	50 Marks	Total Hours	40
Course Objective: To provide a comprehensive understanding of block chain technology, including cryptographic foundations, consensus algorithm, block chain models.			
Course Outcomes (COs): Upon completion of the course, students shall be able to:			
No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the types, benefits and limitations of blockchain and bitcoin.	1	-
2.	Explore the blockchain decentralization, cryptography concepts and smart contracts	2	-
3.	Comprehend the blockchain applications outside of currencies	1	-
4.	Demonstrate topics and participate in quizzes to assess knowledge.	9,12	-
Course Contents:			
Module 1		10 Hours	
Blockchain: Distributed systems, History of blockchain: Introduction to Blockchain: Electronic cash, Block Chain, Generic elements of a blockchain, Benefits and limitations of blockchain,Types of blockchain, Distributed ledger, Distributed ledger technology, public blockchain, private blockchain, shared ledger, Fully private and proprietary blockchains, Tokenized blockchains, Tokenless blockchains, Consensus, Consensus mechanism, Types of consensus mechanisms, Consensus in blockchain, CAP theorem and blockchain.			
Module 2		10 Hours	
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Disintermediation, Contest-driven decentralization, Routes to decentralization,How to decentralize, The decentralization framework examples, Blockchain and full ecosystem decentralization, Decentralized organizations.			
Introducing Bitcoin: Bitcoin definition, Digital Keys and addresses, Transactions, Blockchain, Mining, Bitcoin Payments.			
Module 3		10 Hours	
Alternative Coins: Theoretical foundations, Alternatives to Proof of work, Various stake types, Difficulty adjustments and retargeting algorithms, Bitcoin limitations, Privacy and anonymity, Extended protocols on top of bitcoin, Development of altcoins, Namecoin, Litecoin			
Smart Contracts: Definition, Ricardian contracts.			
Ethereum: Introduction, Ethereum blockchain, Ethereum Network, Ethereum blockchain (bird's eye view).			
Module 4		10 Hours	
Blockchain-Outside of Currencies: Internet of Things, Physical object layer, Device layer, Network layer, Management layer, Application layer, Government, Border control, Voting, Citizen identification, Health, Finance, Insurance, Post trade settlement, Financial crime prevention, Media.			

Text Books:

1. Mastering Blockchain- Distributed ledgers, Decentralization and smart contracts explained , Imran Bashir, 3rd edition, PacktPu, 2017
2. Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Imran Bashir, PacktPublishing, 2020, ISBN: 9781839213199

Reference Books:

1. Bitcoin and Cryptocurrency Technologies: A Comprehensive introduction, Arvind Narayan, Joseph Bonneau, EdwardW. Felten, Andrew Miller, Steven Gold feder and Jeremy Clark, 2nd edition, Princeton University Press, 2016
2. BlockchainBasics:ANon- Technical Introduction in 25 Steps, Daniel Drescher, First Edition, Apress, 2017

E-book:

1. <https://www.packtpub.com/product/mastering-blockchain-third-edition/9781839213199>

MOOC:

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview

Course Articulation Matrix

Course Outcome	Program Outcomes [POs]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
COs														
CO1	3	2												
CO2		3	2											
CO3			3											
CO4		3			2									

Course Title		Major Project Phase I		
Course Code		22CB606	L-T-P-C	(0-0-4)2
Exam Hrs.		3	Hours/Week	4
SEE		50Marks	Total Hours	40
Course Objective: Identify, analyze and formula the problem statement for project work with systematic and comprehensive approach.				
Course Outcomes(COs): Upon completion of course the students will be able to:				
	No.	Course Outcomes	Mapping to POs	Mapping to PSOs
	1.	Identify a real-world problem and provide feasible solution as a team.	1,2,3,9,10	-
	2.	Conduct experimental analysis of data to ensure conformance to technical specifications and user requirements as a team.	1,3,5,4,9	1,2
	3.	Present the project work as a team.	9,10	-
	4.	Document the project in phases of software development cycle.	8,9,10,11,12	-
Course Contents:				
<p>A team of FOUR students must develop the mini project. However, during the evaluation, each student must demonstrate the project individually.</p> <p>The team may implement a mini project of their choice. However, the project topic selected should broadly be in the area of Engineering.</p> <p>The team must submit a Brief Project Report(25 to 30Pages)at the end which must include the following:</p> <p>Introduction Requirements</p> <p>Software Development Process Model Adopted Analysis</p> <p>and Design Models Implementation Testing</p>				

Course Title	MOBILE APPLICATION DEVELOPMENT LABORATORY		
Course Code	22CB657	L-T-P	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2
SEE	50 Marks	Total Hours	24

Course Objective: To equip students with practical skills in designing, developing and deploying mobile applications. Course Outcomes (COs): Upon completion of the course, students shall be able to:			
No.	Course Outcomes	POs	PSOs
1.	develop mobile applications that perform essential functions like email communication, data storage, and alert systems	3,5	-
2.	develop the skills to produce comprehensive and clear documentation for software applications, ensuring that code is well-commented, and user guides and technical manuals are complete and accessible	8,9,10	-
List of Experiments:			
1. Develop an application that uses GUI components, Font and Colours 2. Develop an application that uses Layout Managers and event listeners. 3. Write an application that draws basic graphical primitives on the screen. 4. Develop an application that makes use of databases. 5. Develop an application that makes use of Notification Manager. 6. Implement an application that uses Multi-threading. 7. Develop a native application that uses GPS location information 8. Implement an application that creates an alert upon receiving a message 9. Write a mobile application that makes use of RSS feed 10. Develop a mobile application to send an email. 11. Develop a Mobile application for simple needs			
Text Books:			
1. "Android Programming: The Big Nerd Ranch Guide" by Bill Phillips, Chris Stewart, Kristin Marsicano 2. "Java: The Complete Reference" by Herbert Schildt 3. "Core Java Volume I--Fundamentals" by Cay S. Horstmann			
Reference Books:			
1. "Database Systems: The Complete Book" by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom 2. "Java Concurrency in Practice" by Brian Goetz 3. "Android Location Services: Creating Location-Based Apps" by Kerri Shotts			

Ability Enhancement Course-IV

Course Title	BUSINESS COMMUNICATION		
Course Code	23CB658D	L-T-P	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2 Hrs
SEE	50 Marks	Total Hours	28
Course Objective: The course aims to develop effective business communication skills, including formal and informal communication, conflict resolution, cross-cultural interactions, and business etiquette. Course Outcomes (COs): Upon completion of the course, students shall be able to:			
No.	Course Outcomes	P	
1.	Write report, project proposals, business presentations, and career planning, equipping them with the essential skills needed for successful job applications, interviews, and professional growth.	6,10	-
2.	Communicate both business and technically, including formal networks, cross-cultural interactions, and effective use of nonverbal cues, enhancing their ability to convey information clearly and professionally in various corporate settings.	6.10	-
List of Activities: <ul style="list-style-type: none"> • Business Communication components, Types, formal communication network, Work team communication, variables, goal, conflict resolution, nonverbal communication, Cross cultural communication, Business meetings, Business Etiquette. • Aspects of technical communication, forms, importance, skills, linguistic ability, style in technical communication. • Understanding Corporate Communication, Employee Communication, Managing Government Relations, Writing for Media and Media Relations. • Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. • Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media. • Corporate Communication in Brand Promotion, Financial Communication, Crises Communication. • Report writing: Characterizing & business reports, Types and forms & reports, • Project proposals, collection of data, tables constitution, charts, writing the report, documenting the sources, proof reading. • Business Presentation: Written and oral presentation, work, team presentation, Delivering the business presentation visual aids, slides, electronic presentation, hand-outs, delivering the presentation. • career planning, preparing Resume, job applications, preparation for a job interview, employment interviews, follow-up. 			
Text Books: <ul style="list-style-type: none"> • Scot Ober, Contemporary business communication, Biztantra, 2014, ISBN-10: 9780198061847 			
Reference Books: <ul style="list-style-type: none"> • Lesiler Flat lay, Basic Business communication, Tata Mc Graw Hill, 2010, ISBN-10: 			