



ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING AND TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24 Computer Science and Engineering (Cyber Security)

SEMESTER VI

SrNo	Course Code	Course Category	Course Title	Hours per Week			Credits	Maximum Marks			Total	No of Hrs for ESE
				L	T	P		Mid Semester Examination	Continual Assessment	End Sem Examination		
1	PCC	23CS601T	Theory of Computation	3	-	-	3	15	15	70	100	3
2	PCC	23CS602T	Security Policies and Implementation	2	-	-	2	7.5	7.5	35	50	1.5
3	PCC	23CS603T	Foundations of Blockchain Technology	3	-	-	3	15	15	70	100	3
4	PCC	23CS604P	Cyber Security Lab – III	-	-	2	1	-	25	25	50	-
5	PEC	23CS605T	Program Elective – II	2	-	-	2	7.5	7.5	35	50	1.5
6	PCC	23CS606P	Computer Lab – II	-	-	2	1	-	25	25	50	-
7	AEC	23AS601T	Economics & Management	2	-	-	2	7.5	7.5	35	50	1.5
8	OE	23CS661O	Open Elective – III	3	-	-	3	15	15	70	100	3
9	ELC	23CS607P	Project – I	-	-	2	1	-	50	50	100	3
10	SEC	23CS641P	Career Development – IV	-	-	2	1	-	50	-	50	1.5
11	MDM	23CS631M	Multidisciplinary Minor – IV	3	-	-	3	15	15	70	100	3
Total				18	-	8	22	82.5	232.5	485	800	

Open Elective - III	
23CS661O(i)	Introduction to Cloud Security
23CS661O(ii)	Mobile App Security Analysis
23CS661O(iii)	Security in Distributed Computing

Program Elective - II	
23CS605T(i)	Managing Risk in Information Systems
23CS605T(ii)	IT Data and Application Security
23CS605T(iii)	Reverse Engineering

MDM - IV	
23CS631M	Basics of Network Vulnerability and Penetration Testing

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Chairman - BoS	Dean – Academics	Date of Release	Version	



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COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS601T	Theory of Computation	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To study the theoretical foundation of finite state machines and its application. To study formal languages and related grammar. To study basic computational function related to finite automaton. 	<p>Students will be able to</p> <ol style="list-style-type: none"> Design the Finite State Machine with mathematical representation. Define regular expression for the given Finite State Machine and vice versa. Represent context free grammar in various forms along with its properties. Design Push down Automaton and Turing Machine as FSM and its various representation. Differentiate between decidable and undecidable problems.

Unit I	[9Hrs]
Strings, Alphabet, Language operations, Finite state machine definitions, Finite automation model, Acceptance of strings and language, Non deterministic finite automation, Deterministic finite automation, Equivalence between NFA and DFA, Conversion of NFA into DFA, Moore and Mealy machines.	
Unit II	[9Hrs]
Regular sets, Regular expressions, Identity Rule, Manipulation of regular expressions, Equivalence between RE and FA, Inter conversion, Pumping lemma, Closure properties of regular sets(proofs not required), Chomsky hierarchy of languages, Regular grammars, Right linear and left linear grammars, Equivalence between regular grammar and finite automation, Inter conversion between RE and RG.	
Unit III	[9Hrs]
Context free grammar, Derivation trees (Syntax tree and Parse tree), Ambiguous Grammar, Context Free Language (CFL), Closure properties of CFL, Normal Form of grammar: Chomsky Normal form, Greibach normal form.	
Unit IV	[9Hrs]
Push Down Automaton, Turing Machine: Definition, Model of TM, Design of TM, Universal Turing Machine, Types of TM's (proofs not required), Turing Computable Functions, Linear bounded automaton.	
Unit V	[9Hrs]
Decidability and Undecidability of problems, Properties of recursive & recursively enumerable languages, Halting problems, Post correspondence problem, Ackerman function, Church's Hypothesis, Recursive Function: Basic functions and operations on them, Primitive recursive function, μ -recursive function, Bounded Minimization, Unbounded Minimization.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Theory of Computer Science, Automata, Languages and Computation	K. L. P. Mishra and N. Chandrasekaran	3 rd Edition	PHI Learning.
2	Introduction to Automata Theory, Languages and Computation	J.E.Hopcraft,R. Motwani, J. D Ullman	2 nd Edition	Pearson Education, Aisa

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Theory of Computation	Sipser	2 nd Edition	Cengage publications
2	An Introduction to Formal Languages and Automata	Peter Linz		
3	Introduction to Languages and the theory of Automata	John Martin		TMH Publication

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS602T	Security Policies and Implementation	2	-	-	2	7.5	7.5	35	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To introduce the fundamental concepts of information security policies To familiarize students with governance principles and policy frameworks. To enable students to analyze security risks and challenges. To provide comprehensive knowledge of various types of information security policies To equip students with the ability to design, evaluate, and implement IT security policies 	<p>Students will be able to</p> <ol style="list-style-type: none"> Explain the need, purpose, and scope of IT security policies and their role in ensuring information systems security and assurance. Analyze governance structures and compliance laws (Indian and international) and evaluate their impact on organizational security policies. Design and recommend effective security policies and frameworks considering organizational needs, compliance requirements, risk factors, and implementation challenges.

Unit I: The Need for IT Security Policy Frameworks	[10 Hrs]
Introduction to Security Policies, Information Systems Security, Information Assurance Information systems Security Policies, Business Drivers for Information Security Policies.	
Unit II: Role of Governance and Policy Framework	[10 Hrs]
Compliance Laws – India, Compliance Laws – International, Seven Domains of IT Infrastructure, Business Challenges & Policies to Mitigate the Risks, Information Security Policy Implementation Issues, Program Framework Policy, Business Considerations for Framework, Information Assurance Considerations, IT Security Standards & Frameworks.	
Unit III: Types of Policies	[10 Hrs]
User Domain Policies, IT Infrastructure Security Policies, Data Classification and Handling Policies, Risk Management Policies, Incident Response Team (IRT) Policies, Special Access Policies, Physical Security Policy, DLP Policies.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Security Policies and implementation Issues	Robert Johnson & Chick Easttom. Jones & Bartlett Learning	Third Edition	Wiley Publishing.
2	Computer Security Handbook	Seymour Bosworth, M.E. Kabay & Eric Whyne	Fifth Edition	Wiley Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Cyber Crime Law and Practices	CS Mamta Binani	1st	The Institute of Company Secretaries of India

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS603T	Foundations of Blockchain Technology	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To explore the building blocks of Blockchain. To analyze the significance of Distributed Ledger Technology and Smart Contract. To exploit applications of Blockchain in real world scenarios and their impacts 	<p>Students will be able to</p> <ol style="list-style-type: none"> Explore the Blockchain ecosystem and its services in real-world sceneries. Apply and analyze the requirements of Distributed Ledger Technology. Illustrate the Smart Contracts and their use cases. Apply concepts to explain the structure and workflow of decentralized applications. Acquaint the protocol and assess computational requirements of Blockchain Ecosystems.

Unit I : Foundations of Blockchain	[10Hrs]
Blockchain Architecture – Challenges – Applications – Blockchain Design Principles -The Blockchain Ecosystem - The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - peer-to-peer network – Abstract Models - GARY model - RLA Model - Proof of Work (PoW) - Proof of Stake (PoS) based Chains - Hybrid models.	
Unit II: Distributed Ledger Technology	[10 Hrs]
Origin of Ledgers – Types and Features of Distributed Ledger Technology (DLT) - Role of Consensus Mechanism - DLT Ecosystem - Distributed Ledger Implementations – Blockchain - Ethereum - Public and Private Ledgers – Registries – Ledgers - Practitioner Perspective:Keyless Technologies,	
Unit III: Smart Contracts	[8 Hrs]
Anatomy of a Smart Contracts - Life Cycle - Usage Patterns - DLT-based smart contracts -Use Cases: Healthcare Industry and Property Transfer.	
Unit IV: Decentralized Organization	[8 Hrs]
Decentralization versus Distribution - Centralized-distributed (Ce-Di) organizations -Decentralized-distributed (De-Di) organizations - Decentralized Autonomous Organizations: Aragon, DAOstack, DAOhaus and Colony.	
Unit V: Types of Blockchain Ecosystem	[9 Hrs]
One-Leader Ecosystem - Joint Venture or Consortia Ecosystems - Regulatory Blockchain Ecosystems - Components in Blockchain Ecosystem: Leaders, Core Group, Active Participants, Users, Third-Party Service Providers - Governance for Blockchain Ecosystems.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Blockchain enabled applications.	Dhillon, V., Metcalf, D., and Hooper, M	1 st Edition	CA: Apress, Berkeley
2	Blockchains, digital assets, smart contracts, decentralized autonomous organizations	Diedrich, H., Ethereum	1 st Edition	Packt Publishing

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Distributed Ledger Technology: The Science of the Blockchain	Wattenhofer, R. P,	2nd Edition	Createspace Independent Pub, Scotts Valley, California, US

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CS604P	Cyber Security Lab - III	-	-	2	1	25	25	50

Course Objective	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> 1. Understand Security Concepts: Gain foundational knowledge of network security principles, protocols, and architectures. 2. Threat Identification: Develop skills to identify, analyze, and mitigate various network vulnerabilities and threats. 3. Security Mechanisms: Learn to implement and manage security tools, techniques, and policies to protect network infrastructure. 4. Incident Response: Equip learners with the ability to detect respond to, and recover from network security breaches. 	<p>Students will be able to</p> <ol style="list-style-type: none"> 1. Comprehend Security Fundamentals: Demonstrate a solid understanding of network security concepts, threats, and defense mechanisms. 2. Implement Security Measures: Apply appropriate tools and techniques to secure network infrastructures and ensure data integrity. 3. Analyze and Mitigate Threats: Identify and Address potential network vulnerabilities and actively mitigate security risks. 4. Respond to Security Incidents: Develop strategies for effective incident detection, response, and recovery in real-world scenarios.

Experiment No.	Name of Experiment	CO
1	VLAN – Inter VLAN	1
2	Configuring Standard and Extended ACLs	1
3	Routing Protocol, RIP, EIGRP, OSPF	1
4	IPSec VPN with Advanced Configuration	2
5	Wireless Security Simulation	2
6	Multilayer Switch Configuration	3
7	IPv6 Network Setup	3
8	IPv6 Routing Configuration	3
9	AAA Configuration	4
10	Bridge connection between routing protocols	4

Text Books

S.N	Title	Authors	Edition	Publisher
1	CCNP and CCIE Enterprise Core ENCOR 350-401 Official Cert Guide	Brad Edgeworth, Ramiro Garza Rios, David Hucaby, Jason Gooley	2nd Edition	Cisco Press / Pearson
2	IPSec Virtual Private Network Fundamentals	James Henry Carmouche	1st Edition	Cisco Press

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS605T	PE-II Managing Risk in Information Systems	2	-	-	2	7.5	7.5	35	50

Course Objectives	Course Outcomes
This course is intended 1. To Understand context of information security management, Identify and value information assets 2. Identify and prioritize threats to information assets. 3. Define an information security strategy and architecture.	Students will be able to 1. Analyse risk and to mitigate risks and able to perform testing and vulnerability assessment. 2. Able to manage information security and evaluate. 3. Design information architecture using secure coding practices.

Unit I	[10 Hrs]
Concepts of risk management- Risk based planning of Information Risk management of Information Systems, Why Risk Assessment, and When Risk Assessment to be conducted. Information Security Risk Analysis, Approaches to risk analysis / assessment, Risk Assessment, Risk Mitigation, Effectiveness Evaluation, Risk due to Social Engineering, Cost Benefit Analysis.	
Unit II	[10 Hrs]
Disaster Recovery & Business Continuity Management, Business impact analysis, Business Continuity and DR Plan development, Exercising, Maintenance and revision of plan, importance of training, Objectives and methods for risk assessment, Introduction to Snort, Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes	
Unit III	[10 Hrs]
Managing Information Security, Organization and responsibilities, Information Security Governance, Security Incident Management, Application Security, Data and information Analyze, evaluate and design information architecture, Role of databases and database management systems, Knowledge management systems and data warehouses, Secure Coding Practices, ISO 27001 - Domains, Introduction to SOX, HIPAA, CoBIT.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	A practical guide to security assessments	Kairab, Sudhanshu	2nd Edition	CRC Press; 2004
2	Information Security Management Handbook,	Harold F. Tipton and Micki Krause,	5th Edition	CRC Press; 2004

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Assessing Network Security,	Kevin Lam, David LeBlanc and Ben Smith,	1st Edition	Microsoft Press; 2004
2	Web Security, Privacy & Commerce	Simson Garfinkel	2nd Edition	O'Rely, Computer networks / Security measures; 2002

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CS606P	Computer Lab-II	---	---	2	1	25	25	50

Course Objectives	Course Outcomes
<p>This course is intended</p> <p>1: Develop practical skills in implementing and analyzing the time and space complexity of fundamental and advanced algorithms.</p> <p>2: Apply algorithmic strategies such as greedy method, divide-and-conquer, dynamic programming, and backtracking to design efficient solutions for computational and optimization problems.</p> <p>3: Build technical competency through hands-on coding, performance evaluation, and problem-solving using graph algorithms, DP, and state-space search techniques</p>	<p>Students will be able to</p> <ol style="list-style-type: none"> 1. Implement and analyze the performance of basic and advanced sorting and searching algorithms using appropriate complexity metrics. 2. Apply greedy strategies to solve scheduling, resource allocation, and shortest path problems, and evaluate their computational efficiency. 3. Develop and assess dynamic programming solutions for complex optimization and shortest path problems such as 0/1 Knapsack, TSP, and Floyd-Warshall. 4. Design and implement backtracking-based solutions for constraint satisfaction problems including 8-Queens, Graph Coloring, and Subset Sum with effective pruning strategies.

UNIT	Contents	Design and Analysis of Algorithm
1	<p>Basic Algorithms & Complexity:</p> <p>Experiment 1: Implementation & time complexity analysis of basic sorting algorithms Bubble Sort, Insertion Sort, Selection Sort</p> <p>Experiment 2: Implementation & analysis of Advanced Sorting Algorithms: Merge Sort, Quick Sort (Comparison of Divide & Conquer techniques)</p> <p>Experiment 3: Implementation of Searching Techniques: Linear Search, Binary Search (Comparison of their time complexities on various inputs)</p>	
2	<p>Greedy Method</p> <p>Experiment 4: Job Sequencing with Deadlines using Greedy Approach (Profit maximization + complexity evaluation)</p> <p>Experiment 5: Fractional Knapsack Problem using Greedy Method (Efficiency comparison using different item sets)</p> <p>Experiment 6: Dijkstra Shortest Path Algorithm (Hands-on path optimization + time complexity analysis)</p> <p>Experiment 7: Minimum Cost Spanning Tree using Kruskal's Algorithm (Union-Find + sorting-based optimization)</p> <p>Experiment 8: Minimum Cost Spanning Tree using Prim's Algorithm (Adjacency matrix vs adjacency list performance comparison)</p>	
3	<p>Dynamic Programming (DP)</p> <p>Experiment 9: All-Pairs Shortest Path using Floyd-Warshall Algorithm (Time complexity $O(n^3)$ demonstration)</p> <p>Experiment 10: Travelling Salesman Problem (TSP) using Dynamic Programming (Small input sets + exponential complexity observation)</p> <p>Experiment 11: 0/1 Knapsack Problem using Dynamic Programming (Bottom-Up DP) (Compare results with Greedy Fractional Knapsack)</p>	
4	<p>Backtracking & State-Space Search</p> <p>Experiment 12: 8-Queens Problem using Backtracking (Node exploration + pruning techniques)</p> <p>Experiment 13: Graph Coloring Problem using Backtracking (Chromatic number computation for sample graphs)</p>	
5	<p>Advanced/Optional Skill Enhancement</p> <p>Experiment 14: Subset Sum / N-Queens / Sudoku Solver using Backtracking (Any One) (Shows complexity explosion + solution pruning)</p>	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Cormen T.H	Second	Prentice Hall of India
2	Foundations of Algorithms	S. R. Sathe	Second	Penram International

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Algorithms	Horowitz, Sahani, Rajsekharan	Second	Galgotia Publications Pvt. Ltd
2	Fundamentals of Algorithms	Brassard, Bratley	Second	Prentice Hall
3	Data Structures and Algorithms	Alfred V. Aho, John E. Hopcroft, J. D. Ullman	Reprint 2006	Pearson Education

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23AS601T	Economics & Management	2	-	-	2	7.5	7.5	35	50

Course Objectives	Course Outcomes
At the end of course, students will be able to: The course examines how the economics, business and industrial management practices are related and how business decision is taken.	At the end of course, students will be able to: <ol style="list-style-type: none">1. Apply economic principles for business decisions by understanding production cost relationships2. Assess impact of macroeconomics and government policies on business and economy.3. Recognize key management, marketing, financial and HRM functions and their role in effective business decision-making

Unit I	[10Hrs]
Economics, Classification of economics, Industrial economics, Consumer demand, Law of Demand, Determinants of demand, Demand forecasting, Law of supply, Types of Elasticity of demand, Concept of Production, Factors of Production, types of cost, cost curves,	
Unit II	[10Hrs]
Market Structures-Perfect competition, Monopoly, and Monopolistic competition, Functions of central bank, Inflation, Deflation, Recession, National income, GDP, GNP, Liberalization, Privatization and Globalization	
Unit III	[10Hrs]
Definition of management, functions of management, Functions of human resources Management, Marketing Management, Functions of Marketing Management. Methods of pricing, advertising and sales promotion. Financial Management, functions of financial management, Sources of finance.	

Text Books

S. N	Title	Authors	Edition	Publisher
1.	Managerial Economics	D.N. Dwivedi	8th	Vikas Publishing
2.	Modern Economic Theory	K.K. Dewett	2005	S. Chand Publisher
3.	Industrial Management	Dr.I.K. Chopde, Dr.A.M. Sheikh	Revised edition	S. Chand Publisher

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Industrial Organization and Industrial economics	T.R. Banga, S.C. Sharma	2006	Khanna Publishers

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS661O	OE- III Introduction to cloud Security	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended</p> <ol style="list-style-type: none"> To introduce the fundamental concepts and evolution of cloud computing To develop an understanding of virtualization technologies. To enable students to analyze resource management and load balancing mechanisms. To provide knowledge of cloud data security and storage concepts. To familiarize students with Identity and Access Management (IAM) 	<p>Students will be able to</p> <ol style="list-style-type: none"> Articulate the concepts of cloud computing, its various deployment and service models and vulnerabilities. Develop solutions based on the concept of virtualization, resource management and migration. Design measures for cloud data security and identity management. Provide recommendations for Cloud Infrastructure Security based on cloud compliance and policies. Demonstrate understanding of Identity and Access Management (IAM) principles, architectures, standards, and authorization mechanisms used in cloud environments.

Unit I	[10 Hrs]
Introduction: Evolution of Cloud Computing, Cloud Fundamentals: Cloud Definition, Evolution, Architecture, Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning, Applications, deployment models - Public, Private and Hybrid Clouds, and service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage. Software as a Service (SaaS) - Anything as a service (XaaS), Security as a service. Vulnerability Issues and Security Threats, Security Challenges	
Unit II	[10 Hrs]
Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Issues with virtualization, virtualization technologies and architectures, introduction to Various Hypervisors, virtualization of data centers, and Virtual Machine level Security, Virtualization security Issues	
Unit III	[10 Hrs]
Resource Management and Load Balancing : Distributed Management of Virtual Infrastructures, Resource management, Load Balancing Interoperability, Migration and Fault Tolerance: Issues with interoperability, Cloud Migration, Migration of virtual Machines and techniques. Fault Tolerance Mechanisms. Risk Assessment on Cloud Migration	
Unit IV	[10 Hrs]
Cloud Data Security and Storage : Cloud storage: Introduction to Storage Systems, Cloud Storage Concepts, Data in the cloud- Cloud file systems. Data level Security, Data Protection (rest, at transit, in use), Data Information lifecycle, Cloud Data Audit, Multi-tenancy Issues.	
Unit V	[5 Hrs]
Identity and Access Management : Introduction to Identity and Access Management, IAM Challenges, IAM Architecture, IAM Standards and Protocols for Cloud Services, Cloud Authorization Management.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Distributed and cloud computing from Parallel Processing to the Internet of Things	Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra	1st	Morgan Kaufmann, Elsevier – 2012
2	Cloud Computing with Security: Concepts and Practices	Naresh K. Sehgal, Pramod Chandra P. Bhatt, John M. Acken	2nd	Springer, 2020

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Cloud Computing Bible	Barrie Sosinsky	1st	John Wiley & Sons
2	Cloud Computing Principles and Paradigms	Ronald L. Krutz, Russell Dean Vines,	1st	Wiley Publishers.

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23CS641P	Career Development VI	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
<p>1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors.</p> <p>2. This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.</p> <p>3. To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.</p>	<p>1. Students shall solve real life problems comparison of various probabilities, Permutation and combinations to ascertain the best outcomes expected</p> <p>2. Students shall draw conclusions or Understand geometrical terminology for angles, triangles, quadrilaterals and circles with the help of formulas.</p> <p>3. The ability to analyze and interpret different forms of data, including tables, graphs, charts, and more.</p> <p>4. Enable students to critically analyze material (information) in order to evaluate evidence, construct reasoned arguments, and communicate inferences and conclusions.</p> <p>5. The ability to analyses visual information and solve problems based on visual reasoning.</p>

Unit I	[6Hrs]
Aptitude:- Permutation and Combinations:- Letter Arrangement, Number Arrangement, miscellaneous questions Probability:- Color balls, Dice Problems, coins Problems, Playing Cards Problem, Miscellaneous Imax:- Learn Start-up, True Entrepreneurship,	
Unit II	[6Hrs]
Aptitude: - Mensuration: - 2-Dimension Problems, 3-Dimension Problems, Area, Volume, Surface Area, Total Surface Area. Geometry: - Lines, Circle, Triangles Etc. Imax:- Personal Accountability, Innovation Lessons from our Ancestors	
Unit III	[6Hrs]
Aptitude:- Data Interpretation:- Tabular DI Bar Graph Line graph Pie Char	
Unit IV	[6Hrs]
Aptitude:- Logical Thinking (Syllogism) and Venn Diagram problem:- Some, No, All, Some Not, Very Few, Few, Possibility Problem Imax:- Interview Practice 1, Interview Practice 2, Interview Practice 3	
Unit V	[6Hrs]
Aptitude:- Non Verbal Reasoning:- Mirror Images, Water Images, Paper Cutting, Paper Folding, Fig Embedded Imax:- Interview Practice 4, Interview Practice 5, Interview Practice 6	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		

		July 2025	NEP 1.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	



Sixth Semester

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS607P	Project - I	-	-	2	1	--	50	50	100

Course Objectives	Course Outcomes
<p>The Project I, students will be able to identify and analyze societal and community-oriented security challenges by applying fundamental cyber security principles and tools. They will demonstrate the ability to investigate real-world problems, collect and analyze relevant security-related data, and propose feasible, data-driven solutions that enhance digital safety and resilience. Students will also exhibit ethical responsibility in handling sensitive information, apply secure methodologies aligned with professional standards, collaborate effectively in teams, and reflect on the broader social impact of cyber security practices in alignment with NEP 2.0 and community-centric learning objectives.</p>	<ol style="list-style-type: none">1. Identify and analyze societal and community-oriented cyber security problems by applying fundamental concepts of cyber security and data-driven investigation techniques.2. Collect, preprocess, and analyze relevant security-related data using basic cyber security tools and methodologies to derive meaningful insights.3. Design and propose feasible, data-driven cyber security solutions that address real-world community challenges.4. Demonstrate ethical responsibility in handling sensitive data, ensuring privacy, confidentiality, and compliance with professional and legal standards.5. Work collaboratively in teams, communicate technical findings effectively, and reflect on the societal impact of cyber security interventions in alignment with experiential learning principles and NEP 2.0 guidelines.

	[4Hrs]
<p>Students shall undertake a Project based on Community Engagement, preferably in collaboration with local communities, NGOs, schools, healthcare centers, municipal bodies, or campus-related stakeholders. The project should focus on applying cyber security concepts to solve or analyze a real-life problem of societal relevance.</p>	

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ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2023-24

COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
23CS631M	MDM-IV :Basics of Network Vulnerability and Penetration Testing	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
<p>This course is intended to :</p> <ol style="list-style-type: none"> 1. Explain the basic principles and techniques of how attackers can enter computer systems. 2. Put acquired knowledge into practice by performing ethical penetration tests and hiding the intrusion. 3. Evaluate the societal role of hacking from a social, ethical and economic standpoint 	<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Perform analyses of data breaches. 2. Audits of information technology security. 3. Evaluate the strengths and weaknesses of various information technology. 4. Provide solutions regarding data security. 5. Independently present and perform demonstrations of pen tests for educational purposes

Unit I **[9Hrs]**

Security Fundamentals:
OWASP: Introduction to web applications security, threats and OWASP principles, introduction to secure design, web server: introduction a secure setup of Apache, firewalling a server Browser: general concepts, functionalities, browsers war, configuration (HTTP-cookies, contents, scripting etc. attack to browsers, and users tracking/profiling (third party cookies, super cookies, XSS, CSFR, Command Injection), browser security (add-ons, plugins, same-origin policy, etc.) & secure browsing.

Unit II **[9Hrs]**

Attacks to privacy, (spyware & backdoors, browser, email etc.) Tracking techniques: (HTTP cookies, third-party cookies, browser fingerprinting, CSP) Advanced browser configuration, anonymity, and onion routing (Tor). Internet E-mail: Architecture and infrastructure, functions, agents and standards, phishing, spamming & spoofing, DKIM, SPF, introduction to email forensics.

Unit III **[9Hrs]**

Introduction to ethical hacking Terminology-Five stages of hacking-Vulnerability Research implication of hacking Impact of hacking. Footprinting & Social engineering.

Unit IV **[9Hrs]**

Information gathering methodologies- Competitive Intelligence- DNS Enumerations- Social Engineering attacks. Scanning & Enumeration Port Scanning-Network Scanning- Vulnerability Scanning- NMAP scanning tool- OS Fingerprinting Enumeration. System Hacking Password.

Unit V **[9Hrs]**

Sniffers & SQL Injection Active and passive sniffing- ARP Poisoning- Session Hijacking- DNS Spoofing- Conduct SQL Injection attack – Counter measures. Cracking techniques- Key loggers- Escalating privileges- Hiding Files-Steganography technologies- Countermeasures.

Text Books

S. N	Title	Authors	Edition	Publisher
1	Kimberly Graves, "CEH: Official Certified Ethical Hacker Review Guide",	Bruice Schneier	II Edition 2007.ISBN: 978-0-7821-4437-6.	Wiley India Pvt ltd
2	Network Security and Cryptography	Bernard Menzees	I Edition	Cengage Learning

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Backtrack -4: Assuring security by penetration testing	Shakeel Ali & Tedi Heriyanto	PACKT Publishing	Pearson edition

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