Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course: Compiler Design **Course Code:CSE701T**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PCC		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE701T	Compiler Design	3	--	--	3	40	60	100	3

Prerequisite(s): TOC or FLA Course

Objectives:

1.	To understand types of compiler and its phases.
2.	To provide an understanding of the fundamental principles in compiler design.
3.	To apply the optimization techniques to have a better code for code generation.

Course Outcomes:

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

CO1	Understand the basics of compiler and translator.
CO2	Learn top down and bottom up parsers.
CO3	Summarize the intermediate code for statements in high level language
CO4	Design syntax directed translation schemes for a given context free grammar.
CO5	Apply optimization techniques to intermediate code and generate machine code for high level language program.

Unit 1: INTRODUCTION TO COMPILERS **(08 Hours)**

Overview of compiler and translator, types of Compiler, Analysis of the Source Program, The

Phases of a Compiler, grouping of phases, Cousins of the Compiler, design of lexical Analysis, compiler writing tools, Cross compiler-bootstrapping

Unit 2: SYNTAX ANALYSIS **(10 Hours)**

Review of Context –Free Grammars- Derivation tree and Parse Trees, Ambiguity, Top-Down Parsing: Recursive Descent Parsing, Predictive Parsing,LL(1) Grammars, Bottom-Up Parsing Shift Reduce parsing-Operator precedence parsing(Concept only)LR parsing – Constructing SLR parsing tables. Constructing, Canonical LR parsing tables and Constructing LALR parsing tables.

Unit 3: SEMANTIC ANALYSIS **(06 Hours)**

Need of Semantic analysis, Abstract Parse trees for Expression , Variables,statements,functions and class declarations, Syntax directed definitions Syntax directed translation schemes for declaration processing ,type analysis, scope analysis ,Symbol Table(ST) ,Organization of ST for block structure and non-block structured languages, Symbol Table management

Unit 4: INTERMEDIATE CODE GENERATION ERROR RECOVERY **(06 Hours)**

Intermediate code generation: Intermediate languages, Design issues Translation of different language features, different types of intermediate forms, Error Handling and Recovery in Syntax Analyzer –YACC-Design of a syntax Analyzer for a Sample Language.

Unit 5: CODE OPTIMZATION **(06 Hours)**

Principal Sources of Optimization –DAG –Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms- Issues in Design of a Code Generator –A Simple Code Generator Algorithm Recent trends and Compiler tools, advanced topics & its Application

.Virtual Machines and Interpretation Techniques, Just-In-Time(JIT)and Adaptive Compilation

Text Books:

- Alfred V. Aho, Monica S Lam, R.Sethi and J.D.Ullman “Compilers. Principles, techniques and tools” Pearson Education.
- “Modern Compiler Implementation in ML” by Andrew W. Appel Cambridge University 1998.

Reference Books:

- Kenneth C Louden, “Compiler Construction Principle and Practice” PWS publishing Company, 1997.
- Dhamdhere D.M. “Compiler Construction Principle and Practice” Mac Millan India, New Delhi 1983.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course: Compiler Design Lab **Course Code: CSE701P**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PCC		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE701P	Compiler Design Lab	--	--	02	1	25	25	50	-

Course Objectives:

1.	To learn usages of tools LEX,YAAC
2.	To develop a Code generation
3.	To Implement different code optimization scheme.

Course Outcomes:

At the end of this course student will be able to:

CO1	Generate scanner and parse from formal specification.
CO2	Generate top down and bottom up parsing tables using Predictive Parsing SLR and LR Parsing techniques
CO3	Apply the knowledge of YACC to syntax directed translation for generating intermediate code -3 address code.
CO4	Build a Code generator using different using different intermediate codes and optimize the target code.
CO5	Generate scanner and parser from formal specification.

Expected Experiments to be Performed

1. Sample Programs using LEX.
2. Scanner Generation using LEX.
3. Elimination of Left Recursion in a grammer.
4. Left Factoring a Grammer.
5. Top Down Parsers
6. Bottom up Parsers.
7. Parser Generation using YACC.
8. Intermediate code Generation.
9. Target code Generation.
10. Code optimization.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course Name – Distributed Operating System **Course Code –CSE702T**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PCC		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE702T	Distributed Operating System	3	--	--	3	40	60	100	3

Objectives:

1.	To provide hardware and software issues in modern distributed systems. □ □
2.	The course focus primarily on the principles and design of distributed systems
3.	This course cover communication, distributed storage, naming, synchronization, scheduling, fault tolerance and recovery.

Course Outcomes :

On completion of this course, learner will be able to:

CO1	Apply knowledge of basic distributed system techniques and concepts
CO2	Comprehend issues in mutual exclusion,
CO3	Comprehend issues in deadlock detection, and agreement protocols in the context of distributed systems.
CO4	Realize design issues for distributed file system, distributed shared memory and distributed scheduling.
CO5	Recognize the importance of fault tolerance and failure recovery in a distributed environment.

UNIT I:Introduction of Distributed Operating System (DOS) (7 Hours)
Examples of distributed systems, challenges, architectural models, issues in distributed operating systems, communication primitives, Theoretical Foundations - inherent limitations of a distributed system, Lamports logical clocks, vector clocks, casual ordering of messages, global state, cuts of a distributed computation, termination detection

UNIT II: Distributed Mutual Exclusion: (7 Hours)
Introduction, classification of mutual exclusion and associated algorithms (token based and non-token based approach), a comparative performance analysis.

UNIT III: Distributed Deadlock Detection: (8 Hours)
Introduction, deadlock handling strategies in distributed systems, issues in deadlock detection and resolution, control organizations for distributed deadlock detection, centralized and distributed deadlock detection algorithms, hierarchical deadlock detection algorithms. **Agreement protocols:** introduction, the system model, a classification of agreement problems, solutions to the Byzantine agreement problem

UNIT IV:Distributed File system: (7 Hours)
Introduction to DFS , design issues , File service architecture ,
Distributed shared memory: design issues, Architecture, algorithms for implementing DSM, memory coherence and protocols

UNIT V:Failure Recovery: (7 Hours)
introduction, basic concepts, classification of failures recovery in concurrent systems, consistent set of check points, synchronous and asynchronous check pointing and recovery. Fault Tolerance: Introduction, Atomic Actions and committing, Commit protocols, Voting Protocols

Text Books:

1. Advanced concepts in Operating Systems – Singhal and Shivratri; McGraw Hill Coulouris, Dollimore, Kindleberg;
2. Distributed Systems Concepts and Design, Fourth Edition, Pearson education, 2009.
3. Distributed Systems An Algorithmic Approach, Second Edition, Sukumar Ghosh, CRC Press.

Reference Books:

1. Andrew S. Tanenbaum; Distributed Operating System; Pearson education; 2003.
2. Pradeep K. Sinha, "Distributed Operating System-Concepts and Design", PHI, 2003

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course: PEC IV- Cyber Security & Digital Forensics **Course Code: CSE703T-1**

Type of Course: PEC-IV	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE703 T-1	Ele-IV Cyber Security & Digital Forensics	2	--	--	2	20	30	50	2

Prerequisite(s): Basic knowledge of computer network, cybercrime.

Course Objectives:

1.	To enhance awareness cyber forensics.
2.	To understand issues in cybercrime and different attacks.
3.	To understand underlying principles and many of the techniques associated with the digital forensic practices.
4.	To know the process and methods of evidence collection.
5.	To analyze and validate forensic data collected.

Course Outcomes:

CO1	Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
CO2	Build appropriate security solutions against cyber-attacks.
CO3	Underline the need of digital forensic and role of digital evidences.
CO4	Explain rules and types of evidence collection.
CO5	Analyze, validate and process crime scenes.

UNIT I: Cyber Crime and Computer Crime: [07 Hours]

Introduction to Digital Forensics, Definition of Cybercrimes and Computer crimes, Use of computer forensics in law enforcement Computer forensics services, Benefits of professional forensics methodology, Steps taken by computer forensics Specialists, Types of Business Computer Forensics technology, Types of Law enforcement-computer Forensics Technology

UNIT II: Computer Forensics evidence and capture [07 Hours]

Data recovery Defined- data backup and Recovery-The role of Back up in Data recovery, Data recovery solution. Evidence collection and Data seizure: why collect Evidence? Collection Options- Obstacles-Types and Evidence-the rule of evidence-volatile evidence-general Procedure-Collection and archieving-Mehods of Collection-Art Facts-Collection Steps-controlling Contamination: the chain of Custody.

UNIT III: Computer forensics analysis and validation: [07 Hours]

Determining what data to collect and analyze, Validating Forensics data, addressing data-hiding techniques, performing remote acquisition.

Network forensics: Network forensics overview, performing live acquisition, developing standard procedures for network forensics, using network tools, examining the honey net project.

Processing crime at incident scene: Identifying digital evidence, collecting evidence in private sector incident scene, Processing Law enforcement crime scenes, preparing for search, securing a computer incident or crime scenes, seizing digital evidence at the scene, storing digital evidence

Text Books:

- Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
- Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning.

Reference Books:

- Real Digital Forensics by Keith j.Jones, Richard Bejitlich, Curtis W. Rose, Addison-Wesley Pearson Education
- Forensic Compiling, ATractitioneris Guide by Tony Sammes and Brain Jenkinson, Springen International edition.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course:PEC IV – Cloud Computing **Course Code: CSE703T-2**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PEC-IV		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE703T-2	Ele-IV Cloud Computing	2	--	--	2	20	30	50	2

Prerequisite(s): Basic concepts of Operating System, File management and Data Storage

Course Objectives:

1.	To introduce fundamental concept of Cloud computing.
2.	To understand virtualization, Cloud Architecture, Services and Security issues.
3.	To analyze cloud security challenges, data protection mechanisms, and able to write case studies on various Cloud Applications.

Course Outcomes:

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

CO1	Understand basic concepts, models, service models, Cloud platforms and characteristics of cloud computing.
CO2	Explain cloud architecture, virtualization & Identify security issues.
CO3	Analyze cloud services and platforms for real-world applications.

Unit I: Introduction to Cloud Computing [8 Hours] [10 Marks]

Evolution of Computing (Grid, Distributed, Utility Computing) , Definition & Characteristics of Cloud Computing , Cloud Service Models: IaaS, PaaS, SaaS, Cloud Deployment Models: Public Cloud , Private Cloud , Community Cloud, Introduction to Popular Cloud Platforms: AWS, Microsoft Azure , Google Cloud Platform (GCP) .

Unit II: Virtualization, Cloud Architecture & Services [8 Hours] [10 Marks]

Introduction to Virtualization: Definition of Virtualization, Adopting Virtualization, Types of Virtualizations, Virtualization Architecture and Software, Virtual Clustering, Virtualization Application, Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Hypervisors (Type 1 & Type 2), Compute Services & Resource Management basic, Cloud Networking Basic

Unit III: Cloud Security, Applications & Case Studies [8 Hours] [10 Marks]

Cloud Security Issues and Challenges , Data Security & Privacy in Cloud , Identity and Access Management (IAM) , Encryption Techniques in Cloud , Backup and Disaster Recovery , Cloud Migration Strategies , Applications of Cloud Computing: E-learning , E-commerce , Healthcare , Case Studies of Cloud Implementation

Text Books:

1. A.Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978- 81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering CloudComputing", McGraw Hill Education, ISBN- 13:978-1-25-902995-0

Reference Books:

1. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A PracticalApproach" McGraw Hill.
2. Tim Mather, Subra K, Shahid L."Cloud Security and Privacy", Oreilly.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course :PEC V –Cryptography & Networking Security **Course Code –CSE704T-1**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PEC		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE704T-1	Cryptography & Networking Security	3	--	--	3	40	60	100	3

Course Objectives:

1.	To develop the student's ability to understand the concept of security goals in various applications and learn classical encryption techniques.
2.	To apply fundamental knowledge on cryptographic mathematics used in various symmetric and asymmetric key cryptography.
3.	To develop the student's ability to analyze the cryptographic algorithms.

Course Outcomes: On completion of this course, learner will be able to

CO1	To understand basics of Cryptography and Network Security and classify the symmetric encryption techniques.
CO2	Understand, analyze and implement the symmetric key algorithm for secure transmission of data.
CO3	To Acquire fundamental knowledge about the background of mathematics of asymmetric key cryptography and understand and analyze asymmetric key encryption algorithms and digital signatures.
CO4	To Analyze the concept of message integrity and the algorithms for checking the integrity of data.
CO5	To understand various protocols for network security.

UNIT I: **(7Hours) (12 Marks)**

Introduction: Attributes of security, OSI Security Architecture, Model for network security. Mathematics of cryptography: modular arithmetic, Euclidean and extended Euclidean algorithm. Classical encryption techniques: substitution techniques-Caesar cipher, Vigenere's ciphers, Hill ciphers, Playfair ciphers and transposition techniques.

UNIT II: **(7 Hours) (12 Marks)**

Symmetric key cryptography: Block Cipher Principles, Data Encryption Standard (DES), Triple DES. Advanced Encryption Standard (AES), RC4, Key Distribution.

UNIT III: **(7Hours) (12 Marks)**

Asymmetric key cryptography: Euler's Totient Function, Fermat's and Euler's Theorem, Chinese Remainder Theorem, RSA, Diffie Hellman Key Exchange, ECC, Entity authentication: Digital signature.

UNIT IV: **(7Hours) (12 Marks)**

Message Integrity and authentication: Authentication Requirements and Functions, Hash Functions, MD5, Kerberos, Key Management, X.509 Digital Certificate format.

UNIT V: **(7Hours) (12 Marks)**

Network Security: PGP, SSL, Firewalls, IDS, Software Vulnerability: Phishing, Buffer Overflow, SQL Injection, Electronic Payment Types,

TextBooks:

1. William Stallings, "Cryptography and Network Security: Principles and Standards", Prentice Hall India, 7th Edition, 2017.

2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, 2010

ReferenceBooks:

1. Nina Godbole, "Information System Security", Wiley India Publication, 2008.

2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network security, private communication in a public world", Second Edition, Prentice Hall, 2002.

3. Christopher M. King, Curtis Patton and RSA press, "Security architecture, Design Deployment and Operations", McGraw Hill Publication, 2001.

Lokmanya Tilak Jankalyan Shikshan Sanstha's
PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING, NAGPUR
Harpur Nagar, Umred Road, Nagpur- 440024
An Autonomous Institution Affiliated to R.T.M. Nagpur University, Nagpur
Accredited with Grade 'A' by NAAC
E-mail: principalpbcoe@gmail.com Website: www.pbcoe.edu.in

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
FOURTH YEAR BACHELOR OF TECHNOLOGY (B.TECH.)
DEGREE COURSE YEAR / SEMESTER: IV/ VII
B. Tech. Seventh Semester (NEP)

Course: PEC V-Introduction to Internet of Thing **Course Code:CSE704T-2**

Type of Course:	Course Name	Hours/Week			Credits	Maximum Marks			ESE Duration (Hrs.)
PEC -V		L	T	P		Continuous Evaluation	End Sem Exam	Total	
Course Code: CSE704T-2	-Introduction to Internet of Thing	3	--	--	3	40	60	100	3

Prerequisite(s):
Course Objectives:

1.	To Learn the concepts and design feature about Internet of things.
2.	To Understand and implement smart systems.
3.	To Understand the Network and Communication aspects
4	To Understand the Security requirements in IoT.

Course Outcomes:

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

CO1	Understand the vision of loT from a global context
CO2	Understand M2M to IoT - A Basic Perspective
CO3	Use of Devices, Gateways and Data Management in IoT,
CO4	Understand the Internet of Things Privacy, Security and Governance
CO5	Implement basic loT applications on embedded platform

Unit I: Introduction to IoT : (07 Hours)

Defining IoT, Characteristics of loT, Physical design of IoT, Logical design of IoT, Furnctional blocks of loT, Communication models & APIs.

Unit II: M2M to loT A Basic Approach: (07 Hours)

Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview-Building an architecture.Main design principles and
needed capabilities, An IoT architecture outline, standards considerations.

Unit III: Network & Communication aspects: (07 Hours)

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

Unit IV: Internet of Things Privacy, Security and Governance: (07 Hours)

Introduction, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in loT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.

Unit V: Developing IoTs: (08 Hours)

Introduction to Python, Introduction to different IoT tools. Developing applications through IoT tools,Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

Text Books:

• Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on- Approach)",

- Edition, VPT, 2014..

• Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor

• Networks: Theory and Practical.

Reference Books:

• Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to

Connecting Everything", | st Edition, Apress Publications, 2013

• Cuno Pfister, Getting Started with the Internet of Things, O'Reilly Media, 2011, ISBN: 978-1-4493-9357-1