Detailed Program

Bachelor of Technology (B.Tech.)

Computer Science Engineering (CSE)

&

CSE with Specialization in AI and ML

Semester-VI

(2025-2029)

DOC202506200022

RNB GLOBAL UNIVERSITY
Educating stars for tomorrow

RNB GLOBAL UNIVERSITY
RNB Global City, Ganganagar Road,
Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System. Accordingly, each academic year is divided into two semesters**, Odd (July-December) and Even (January-June)**. Besides this, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The curriculum for B. Tech (CSE) Program along **for (January-June) Even Semester 2028** with examination pattern is as follows:

Course Scheme

Semester -VI

S. No.	Course Code	Course Category	Course Title	L	T	P	Credits
1	CSEC14350	DSC-23(a)	Theory of Computation	3	0	0	3
2	CSEC14351	DSC-23(b)	Theory of Computation Lab	0	0	2	1
3	CSEC14352	DSC-24(a)	.NET Technologies	3	0	0	3
4	CSEC14353	DSC-24(b)	.NET Technologies Lab	0	0	2	1
5	CSEC14354	DSC-25	Internet of Things (IOT)	3	0	0	3
6		DSE-2(a)	Elective II	3	0	0	3
7		DSE-2(b)	Elective II	0	0	2	1
8		DSE-3	Elective III	4	0	0	4
9		DSE-4	Elective-IV	4	0	0	4
11	SEC077006	SEC-6	Ability & Skill Enhancement– VI	2	0	0	2
12	WHNN99000		Workshops/ Seminars/Human Values/ Social Service/NCC/NSS	-	-	-	1
		Total		**22**	**0**	**6**	**26**

ELECTIVE-II

S.No.	Course Code	Course Name	Credits
1	CSEE14005	Database Administration with Oracle	4
2	CSEE14006	Database Administration with IBM DB2	4
3	CSEE14007	**Advanced Java**	3
4	CSEE14008	**Advanced Java Lab**	1
5	CSEE14009	Data warehouse and Data Mining	4
		Any Related MOOC Course	

ELECTIVE-III

S.No.	Course Code	Course Name	Credits
1	CSEE14010	Network Programming	4
2	CSEE14011	Advanced Data Structures	4
3	CSEE14012	Advanced Database Management System	4
4	CSEE14013	Linux Administration and Shell Programming	4
5	CSEE14014	Wireless Networks	4
6	CSEE14015	**Cloud Computing**	4
		Any Related MOOC Course	

ELECTIVE-IV

S.No.	Course Code	Course Name	Credits
1	CSEE14016	Software Reuse	4
2	CSEE14017	**Software Verification and Validation**	4
3	CSEE14018	Software Design and Construction	4
4	CSEE14019	Software Quality Management	4
5	CSEE14020	Aspect Oriented Programming	4
		Any Related MOOC Course	

SPECIALIZATION ELECTIVES FOR AI & MACHINE LEARNING

S.No.	Course Code	Course Name	L	T	P	Credits
1	CSEE14034	Data Visualization **(E-II)**	3	0	0	3
2	CSEE14035	Data Visualization Lab **(E-II)**	0	0	2	1
3	CSEE14036	Big Data Analytics **(E-III)**	4	0	0	4
4	CSEE14037	Software Verification and Validation **(E-IV)**	4	0	0	4

EVALUATION SCHEME- THEORY

The evaluation of the theory paper of B.Tech would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessments:

The distribution of Internal Assessment Marks is as follows:

Type	Details	Marks
Mid Term	One Mid-term Sessional	25
Quiz	Quiz based on MCQs	5
Marks obtained in various Tests, Assignments, Presentations, Tutorials etc.	Average of Marks obtained	15
Academic Performance including Attendance	Eligibility >75% Attendance	5
TOTAL		**50**

External Assessment

Type	Marks
Theory	50

EVALUATION SCHEME -PRACTICAL

The evaluation of the practical paper of B.Tech would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	45
Academic Performance including Attendance	Eligibility >75% Attendance	5
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- WORKSHOPS & SEMINARS & NCC/NSS

1. NCC/NSS will be completed from Semester I – Semester IV. It will be evaluated internally by the institute. The credit for this will be given at the end of each Semester.

2. The students have to join club/clubs with the active participation in different activities of club. The students would be continuously assessed from Semester-I to Semester-IV and credits and marks would be given after the end of each Semester.

Bachelor of Technology – CSE (Four Years Course)

1. Vision

To deliver a high-quality education that will produce engineers of the highest caliber, equipped with the newest information and cutting-edge concepts in computer science engineering to fulfil the demands of industry and society.

2. Mission

To create an academic setting for the growth of professionals equipped with the knowledge, abilities, values, and self-assurance to assume leadership positions in the field of computer science and engineering.

To promote a culture of research that produces knowledge and cutting-edge technologies that aid in society's sustainable development.

To improve academic collaborations for international exposure.

3. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To produce studentswith strong foundation of knowledge and skills in the field of computer science and engineering.

PEO2: To produce students who are employable in private/public sector/research organizations or work as an entrepreneur.

PEO3: To produce students who can provide solutions to problems in their profession by applying computer engineering theory and practices.

PEO4: To produce graduates who can provide leadership and are effective in multidisciplinary environment.

4. PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitation.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

5. PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.

PSO2: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies/employability in the field of Computer Science & Engineering.

PSO3: Cultivate the field of computing and its latest trends, to pursue teaching, research & development activities and to work effectively in a team.

6. Course Outcomes		
Course Codes & Course Names	**After completion of these courses' students should be able to**	
CSEC14350-Theory of Computation	**CO1:**	Define undecidability and identify class P and NP problems.
	CO2:	Explain regular expressions to FA and minimize Automata.
	CO3:	Apply theoretical concepts and techniques in designing finite automata.
	CO4:	Design a Turing machine and identify recursively enumerable languages.
	CO5:	Design and development of various finite state machines.
CSEC14351-Theory of Computation Lab	**CO1:**	Illustrate the LEX/FLEX tool and write some basic programs.
	CO2:	Build a Deterministic Turing Machine for all inputs and all outputs.
	CO3:	Design program based on Non-deterministic and Deterministic finite automata.
	CO4:	Create a program based on P and NP problems.
	CO5:	Apply algorithms to improve the performance of the translated code.
CSEC14352-. NET Technologies	**CO1:**	Define the basis of .Net framework
	CO2:	Explain the object-oriented Aspects of C# and ASP.Net.
	CO3:	Develop simple applications under .Net framework.
	CO4:	Create Web based Applications using .Net programming languages.
	CO5:	Apply the concept of CORBA and database interfacing in real time projects
CSEC14353-. NET Technologies Lab	**CO1:**	Demonstrate the fundamentals of Web application design, development, and deployment using ASP.NET (Active Server Pages) and the .NET framework.
	CO2:	Make use of Validation controls and Database Queries.
	CO3:	Utilize .NET languages to manage and create web forms, server controls, and web services to accomplish complex data access tasks and implement dynamic content.
	CO4:	Design and Develop web applications using server-side technologies (ASP.NET, ADO.NET).
	CO5:	Analyze appropriate middleware technology to develop real time applications
CSEC14354-Internet of Things (IOT)	**CO1:**	Understand the key components that make up an IoT system
	CO2:	Understand where the IoT concept fits within the broader ICT industry and possible future trends
	CO3:	Familiar with the key technologies and protocols employed at each layer of the IoT stack
	CO4:	Appreciate the role of big data, cloud computing and data analytics in a typical IoT system

	CO5:	Apply the knowledge and skills acquired to build and test a complete, working IoT system
CSEE14007-Advanced Java	**CO1:**	Understand the basics of object-oriented programming using C++ and JAVA.
	CO2:	Apply the concept of classes, Java, JDK Components and develop Simple Java Programs.
	CO3:	Develop Simple Java Programs using inheritance and Exception handling.
	CO4:	Develop Multi-threading Programming and Interfaces.
	CO5:	Develop GUI applications using Applet classes, Swing components and Event handling programs.
CSEE14008-Advanced Java Lab	**CO1:**	Interpret the need for advanced Java concepts like enumerations, Auto Boxing and annotations.
	CO2:	Demonstrate the concept of Collections, Comparators, Legacy classes and Interfaces.
	CO3:	Understand the use of string handling functions
	CO4:	Develop distributed web application using Servlets and JSP.
	CO5:	Apply the concepts of JDBC, Transaction processing, statement objects and Resultset to perform operations on Database
CSEE14015-Cloud Computing	**CO1:**	Apply and design suitable Virtualization concept, Cloud Resource Management, and design scheduling algorithms.
	CO2:	Analyse the Cloud computing setup with its vulnerabilities and applications using different architectures.
	CO3:	Design different workflows according to requirements and apply map reduce programming model.
	CO4:	Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds.
	CO5:	Build a virtual machine with a machine image
CSEE14017-Software Verification and Validation	**CO1:**	Define the fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
	CO2:	Demonstrate on recent automation tool for various software testing for testing software.
	CO3:	Apply different approaches of quality management, assurance, and quality standard to software system.
	CO4:	Design and develop project test plans, design test cases, test data, and conduct test operations.
	CO5:	Apply and analyze effectiveness Software Quality Tools.
SEC077006-Ability and Skill Enhancement -VI	**CO1:**	Learn about verbal reasoning & English aptitude
	CO2:	Develop a winning attitude
	CO3:	Learn the ways to understand news and be a journalist.

	CO4:	Learn the ability to prepare reports on major national and international news.
	CO5:	Conduct chat shows, panel discussions, parliamentary debates etc.

Electives:

CSEE14005-Database Administration with Oracle	**CO1:**	Understand the architecture and components of Oracle Database.
	CO2:	Perform database installation, configuration, and management tasks
	CO3:	Implement backup and recovery strategies using Oracle tools.
	CO4:	Optimize database performance through effective monitoring and tuning.
	CO5:	Learn user and security management in Oracle Database Administration

CSEE14006-Database Administration with IBM DB2	**CO1:**	Explain the architecture, installation, and configuration of IBM DB2
	CO2:	Manage database objects such as tablespaces, indexes, and partitions
	CO3:	Implement backup, recovery, and high availability strategies in IBM DB2
	CO4:	Optimize query performance using indexing, tuning, and workload management
	CO5:	Apply security, user management, and auditing techniques in IBM DB2

CSEE14009-Data warehouse and Data Mining	**CO1:**	Explain the concepts, architecture, and design of data warehouses.
	CO2:	Implement various OLAP operations and multidimensional data modeling techniques.
	CO3:	Apply data mining techniques such as classification, clustering, and association rule mining.
	CO4:	Use algorithms like Apriori, Decision Trees, K-Means, and others for real-world applications
	CO5:	Evaluate the impact of data warehousing and mining on decision-making and business intelligence.

CSEE14010-Network Programming	**CO1:**	Explain networking concepts, protocols, and communication models.
	CO2:	Develop socket programming applications using TCP and UDP.
	CO3:	Implement client-server communication using various protocols
	CO4:	Analyze network performance and implement security measures
	CO5:	Utilize network programming techniques in real-world applications

CSEE14011-Advanced Data Structures	**CO1:**	Understand and analyze advanced data structures and their applications.
	CO2:	Implement balanced trees such as AVL, Red-Black, and B-Trees.
	CO3:	Utilize heaps, hashing, and graphs for efficient data organization.

	CO4:	Apply advanced graph algorithms for real-world problem-solving
	CO5:	Develop efficient data structure solutions for complex applications

CSEE14012-Advanced Database Management System	**CO1:**	Understand and analyze advanced database models and architectures.
	CO2:	Implement query optimization techniques for efficient data retrieval
	CO3:	Apply transaction management and concurrency control mechanisms
	CO4:	Utilize distributed and NoSQL databases for modern applications
	CO5:	Develop database security and recovery mechanisms

CSEE14013-Linux Administration and Shell Programming	**CO1:**	Understand Linux operating system architecture and command-line utilities.
	CO2:	Manage system administration tasks such as user management, process control, and file systems.
	CO3:	Implement shell scripting for task automation and system management
	CO4:	Configure and secure network services in Linux environments
	CO5:	Apply troubleshooting techniques for system maintenance and performance tuning

CSEE14014-Wireless Networks	**CO1:**	Understand wireless communication fundamentals and technologies.
	CO2:	Analyze and compare various wireless network architectures and protocols.
	CO3:	Implement and evaluate wireless network security mechanisms
	CO4:	Configure and optimize wireless networks for different applications
	CO5:	Explore emerging trends in wireless networking, including IoT and 5G

CSEE14016-Software Reuse	**CO1:**	Understand the principles and benefits of software reuse.
	CO2:	Analyze different approaches to software reuse and component-based development.
	CO3:	Apply software reuse techniques in software design and development
	CO4:	Implement software product lines and design patterns for reuse
	CO5:	Evaluate reuse strategies, quality assurance, and economic impact of software reuse

CSEE14018-Software Design and Construction	**CO1:**	Understand the principles, methodologies, and best practices of software design and construction.
	CO2:	Apply software design principles, patterns, and architectures to create efficient software solutions.
	CO3:	Implement best coding practices, debugging, and testing techniques for software development.
	CO4:	Develop software using modularity, reusability, and maintainability principles.
	CO5:	Evaluate and improve software performance, security, and reliability.

CSEE14019-Software Quality Management	**CO1:**	Understand the principles, models, and standards of software quality management.
	CO2:	Apply software quality assurance techniques and testing strategies
	CO3:	Implement software process improvement models and measurement techniques.
	CO4:	Evaluate software quality using industry standards like ISO 9001, CMMI, and Six Sigma.
	CO5:	Analyze real-world case studies and best practices in software quality management.

CSEE14020-Aspect Oriented Programming	**CO1:**	Understand the principles and concepts of Aspect-Oriented Programming (AOP).
	CO2:	Implement AOP techniques such as cross-cutting concerns, join points, and pointcuts
	CO3:	Apply AOP in software development to improve modularity and maintainability
	CO4:	Integrate AOP with object-oriented programming in real-world applications
	CO5:	Evaluate the impact of AOP on software performance, scalability, and security.

CSEE14034-Data Visualization	**CO1:**	Understand the key techniques and theory behind data visualization
	CO2:	Use effectively the various visualization structures (like tables, spatial data)
	CO3:	Use effectively the various visualization structures (like tree and network etc.)
	CO4:	Evaluate information visualization systems and other forms of visual presentation for their effectiveness
	CO5:	Design and build data visualization systems

CSEE14035-Data Visualization Lab	**CO1:**	Use Python, R and Tableau for data visualization
	CO2:	Apply data visuals to convey trends in data over time using tableau
	CO3:	Construct effective data visuals to solve workplace problems
	CO4:	Explore and work with different plotting libraries
	CO5:	Learn and create effective visualizations

CSEE14036-Big Data Analytics	**CO1:**	Identify Big Data and its Business Implications
	CO2:	List the components of Hadoop and Hadoop Eco-System
	CO3:	Access and Process Data on Distributed File System
	CO4:	Manage Job Execution in Hadoop Environment
	CO5:	Develop Big Data Solutions using Hadoop Eco System

CSEE14037-Software Verification and Validation	**CO1:**	Define the fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
	CO2:	Demonstrate on recent automation tool for various software testing for testing software.
	CO3:	Apply different approaches of quality management, assurance, and quality standard to software system.
	CO4:	Design and develop project test plan, design test cases, test data, and conduct test operations.
	CO5:	Apply and analyze effectiveness Software Quality Tools.

7. CO PO Mapping

CSEC14350	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		2	2	3	3		3		2		3
CO2	2	2			3	2		2		2	3	
CO3		2	3	2	2	3			2	2	2	3
CO4	2		2		2			2		3	3	3
CO5	3	3		2			3		3		2	2

CSEC14351	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2		3	3	3	3	3	3	
CO2	2	2	3		3	3		3				3
CO3				3	3				3	3	3	3
CO4	3	3		2	3				3	3	3	
CO5	2		3			3	2	2				3

CSEC14352	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2		2			2	2		3
CO2		3	3		2			2		2	3	3
CO3	2					2			3	3		
CO4	2	2		2		3			3	2		3
CO5			3	2	3		3	3			2	2

CSEC14353	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2			3	3		3	2	
CO2	3		3	3	2			3	2	3		3
CO3	2	2		3	3	3			3		3	
CO4		2	3			3	3	3	3	2		3
CO5	2			3	2		3				3	2

CSEC14354	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2		3			3	2		3
CO2	3		2	3		3				2		3
CO3	2	2			2				2		2	
CO4		2		2		3			3	2		3
CO5	3		3		3		2	2			3	2

CSEE14007	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2			3	3	3	3	3	3	
CO2	2	2		2	3	3		3		3		3
CO3	2		2	3					3		3	
CO4		3	2	2	3					3	3	3
CO5	2					3	2	2	3			3

CSEE14008	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			2	3	3		3				
CO2	3	2	3		3					2	3	3
CO3	2	2	3	2		3			2		2	
CO4			2			3				2	3	3
CO5	2	3		3	2		3	3	3	3	2	2

CSEE14015	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2						2		3
CO2	3		2	3	3	3	3		3		2	
CO3	3	3		2	3	3		2	3	3		3
CO4		2	3	2		3	3	3	3	3	3	3
CO5	2				2		2	3		2	2	

CSEE14017	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3	2	3		2	2			2	3
CO2	3	2	2		3	3						
CO3					2				2			
CO4	2	3	2	3		3			2			3
CO5	2	3		3	3		3	2	3	3	3	2

SEC077006	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14005	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3		3	2	2
CO2	3	3	3	3	3	3	3	3	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14006	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1					3		3	2	2
CO2	3	3	2	2				3	3	3		2
CO3	3	3	3	3	2			3		3	3	2
CO4	3	3	3	2	2	1			3	3	3	3
CO5	3	3	3	2	3	2	1	3	2		2	2

CSEE14009	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	2	3		3		3		3	2	2
CO2	3					2	3	2	3	3		2
CO3			3	2		3		3		3	3	2
CO4	3	3	2	2			3		3	3	3	3
CO5		3	3		3	3	2	3	2		2	2

CSEE14011	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2		3	3	3	3	3	3	
CO2	2	2	3		3	3		3				3
CO3				3	3				3	3	3	3
CO4	3	3		2	3				3	3	3	
CO5	2		3			3	2	2				3

CSEE14012	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14013	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14014	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14016	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14018	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14019	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14034	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14035	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14036	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

CSEE14037	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

8. Curriculum

Course Name: Theory of Computation

Course Code: CSEC14350

Objectives

- This course introduces basic theory of computer science and formal methods of computation. The course exposes students to the computability theory, as well as to the complexity theory.
- Study of Finite Automata, Regular Expressions, Grammars.
- Pushdown Automata, Turing Machines
- Undecidability problems.

Course Outline:

Unit I: Finite State Machine
Recursive definitions, Regular Expressions, definitions of Finite State Machine, Transition Graphs, Deterministic & Non Deterministic. Finite State Machines, Thomson's & Subset Algorithm to convert regular Expression to NDFSM & NDFSM to FSM, Regular Grammar: left linear and right linear. Finite State Machine with output (Moore machine and Melay Machine) Conversion of Moore machine to Melay Machine & Vice-Versa, Pumping Lemma, Properties and limitations of finite state machine.

Unit II: Push Down Stack Machine
Context free Grammar design, Chomsky Normal Form, Push down Stock machine, Context free Grammar and Push down stock machine, Properties of context free grammar: Union, Closure & Intersection, Pumping lemma for context free grammar, Parser Design and Push Down stock machine, CYK algorithm, Earley's Algorithm.

Unit III: Turing Machine
Turing machine, Post machine, conversion of Turing to Post-Wang and vice versa, Combining Turing machine, Chomsky Hierarchy; Church's Thesis, Primitive Recursion Functions, Godelization, Universal Turing machine;

Unit IV: Uncomputability
Halting Problem, Turing Enumerability, Turing Acceptability and Turing Decidabilities. Unsolvable problems about Turing machines, Unsolvable problems about Grammar and

similar system .**Computation Complexity:** P, NP and NP complete problems

Suggested Readings:

1. Daniel A. Cohen, Introduction to Computer Theory, John Wiley and Sons (1996)
2. Hopcroft John E., Ullman Jeffrey D. and Motwani R., Introduction to Automata Theory, Languages and Computation, Pearson Education (2006).
3. Michael Sipser, Introduction to the Theory of Computation, Thomson (2007).
4. Lewis Harry R., Elements of Theory of Computation, PHI (1997).

Course Name: Theory of Computation Lab

Course Code: CSEC14351

Course Outline

- Create a Deterministic Finite Automata (DFA) for the following problems. State the 5 Tuples of the DFA. Construct the Transition Diagram for the DFA as well
- -Program to convert Non-deterministic finite automaton (NFA) to Deterministic finite automaton(DFA)
- Program to generate lexical tokens
- Algorithm:
- Declare an array of characters, as buffer to store the tokens ,that is,'lexbuffer';
- Get token from user put it into character type of variable, say 'c'.
- If 'c' is blank then do nothing.
- If 'c' is new line character line=line+1.
- If 'c' is digit, set token_val ,the value assigned for a digit and return 'NUMBER'.
- If 'c' is proper token then assign the token value. Print the complete table with
    - Token entered by the user
    - Associated token value.
- Study of LEX/FLEX tool and write LEX program to identify tokens: integer numbers, decimal numbers, identifiers, keywords, arithmetic operators, relational operators.
- Program to implement any one code optimization technique.

Course Name: .NET Technology

Course Code: CSEC14352

Objectives

- Understand the importance and architecture of multi-tier Client Server systems

- Analyze and evaluate various components of .net framework
- Design web based client server applications using .net technologies and relevant tools

Course Outline:

Unit I: Introduction

Microsoft .net Platform, Design Goals and Overview; Common Language Runtime: CLR Environment and Executables, Metadata, Assemblies, Intermediate Language, CLR Execution, CLR Functions, CLR Structure.

Programming in .net Framework: Common Programming Model, Features and Languages, Language Integration. Framework Class Library; .net Framework Components: Deployment options, Distributed components, COM+ services, Message queuing.

Unit II : C#

The Basics and Console Applications in C#: Name Spaces - Constructor and Destructors, Function Overloading & Inheritance, Operator Overloading, Modifiers - Property and Indexers , Attributes & Reflection API, When to use Console Applications - Generating Console Output, Processing Console Input.

C#.NET: Language Features and Creating .NET Projects, Namespaces Classes and Inheritance -, Namespaces Classes and Inheritance -, C, Exploring the Base Class Library -, Debugging and Error Handling -, Data Types -, Exploring Assemblies and Namespaces, String Manipulation ,Files and I/O ,Collections.

Unit III: ADO.NET

ADO.NET Architecture, Benefits of ADO.NET, ADO.NET compared to classic ADO -, Datasets, Managed Providers -, Data Binding: Introducing Data Source Controls -, Reading and Write Data Using the Sql Data Source Control.

Windows Forms and Controls in details: The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events, Windows Form Controls, Menus - Dialogs – ToolTips.

Visual Inheritance in C#.NET: Apply Inheritance techniques to Forms, Creating Base Forms, Programming Derived Forms.

Unit IV: Web services

Web services in practice, Web services Framework, Provider, Customer and Security. Web forms: ASP, ASP.NET, Web Form syntax, Data binding, Use of templates, State management and scalability, Application development, ASP.NET and Web services. Windows forms: Introduction, System. Windows, Forms Namespace, Windows Forms development, Windows Forms and Web services;

Suggested Readings:

1. Hoang Lam, Thuan L. Thai, .NET Framework Essentials, O'Reilly Publications.
2. Joe Duffy, Professional .Net Framework 2.0, Wrox Library Books.
3. Jeffrey Richter, Applied Microsoft .NET Framework Programming, Microsoft

Course Name: .NET Technology Lab

Course Code: CSEC14353

Course Outline

1. Simple application using web controls
2. Finding factorial Value
   a) Money Conversion
   b) Quadratic Equation
   c) Temperature Conversion
   d) Login control
3. Adrotator Control
4. Calendar control
   a) Display messages in a calendar control
   b) Display vacation in a calendar control
   c) Selected day in a calendar control using style
   d) Difference between two calendar dates
5. Treeview control
   a) Treeview control and datalist
   b) Treeview operations
6. Validation controls
7. Query textbox and Displaying records
8. Display records by using database
9. Data list link control
10. Data binding using drop down list control
11. Inserting record into a database
12. Deleting record into a database
13. Data binding using data list control
14. Datal ist control templates
15. Data binding using data grid
16. Data-grid control template
17. data grid hyperlink
18. data grid button column
19. Data List event
20. Data grid paging
21. Creating own table format using data grid

Course Name: Internet of Things (IOT)

Course Code: CSEC14354

Objectives:

- Students will develop a solid understanding of the core concepts and principles of the Internet of Things.
- Theywill learn about the interconnectedness of devices, sensors, actuators, and networks, and how these components work together to create smart and interconnected systems.

Course Outline:

Unit 1: Introduction

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit 2: Fundamental devices in IoT

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart
Objects, Communications Criteria, IoT Access Technologies,Smart City IoT Architecture.

Unit 3: Protocols for IoT

IP as the IoT Network Layer, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit 4: Data and Network Analytics in IoT

An Introduction to Data Analytics for IoT, Machine Learning, Network Analytics, Securing IoT, A Brief Historyof OT Security, Common Challenges in OT Security, IT and OT Security Practices.

Unit 5: Implementing IoT

IoT Physical Devices and Endpoints. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to Rasp-berryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Connecting Raspberry Pi via SSH.

uggested Readings:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547).
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Educa- tion, 2017. (ISBN: 978-9352605224).

Course Name: Advance Java

Course Code: CSEE14007

Course Outline

UNIT 1 INTRODUCTION TO WEB TECHNOLOGIES: History of the web, Understanding Web System Architecture, Understanding 3-tier Web Architecture, Overview of HTTP, Introducing HTML document structure, Creating Headings on a web page, Working with links, Creating a Paragraph, Working with images (Hot Spots), Working with tables, working with frames, Introduction to Forms and HTML controls. Inline, External, Internal, Style class, Multiple styles.

UNIT 2 Introducing DHTML, Introducing JavaScript, Client Side benefits of using JavaScript, Embedding JavaScript in an HTML page, Using Variables, Using Operators, Working with Control Flow statements, Working with functions, Handling Events, Using Arrays, Creating objects in JavaScript.

UNIT 3 Introduction to XML, XML Basics, Advanced XML, XML Technologies(DTD),Extensible Style Sheet Transformation (XSLT). Introducing Java Beans, Introspection Design Patterns for properties, methods, events.

UNIT 4 JDBC Architecture, JDBC Drivers, Communicating with Database using JDBC APIs, Creating a Simple Application , Describing Basic JDBC Statement, Creating tables by using JDBC, Working with Prepared Statement. Introducing the MVC architecture, Describing Servlets, Understanding Servlets, Introducing the Servlet API, Servlet Life Cycle, Developing First Servlet Application , GenericServlet Class.

UNIT 5 Understanding Request Processing and HTTP Describing the ServletRequest Interface, Working with Initialization Parameters. Introduction to JSP, Understanding JSP, Describing the JSP Life Cycle, Creating a Simple JSP pages, Working with JSP basic tags and Implicit objects, Working with Java Beans and Action tags in JSP.

Course Name: Advance Java Lab

Course Code: CSEE14008

Course Outline:

Laboratory work:

1. A) Write a Java Program to create an applet that show a simple message along with background and foreground colors?
   B) Write a Java Program to create an applet that scrolls a message from left to right?

2. A) Write a Java Program to create an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked.
   B) Write a Java Program to create an applet that receives a string and returns either it Uppercase r Lowercase, Reverse of given string, and length of a given String.

3. A) Write a java program to draw Lines, ovals, filled ovals and arcs, filled arcs?
   B) Write a java program to draw rectangle, filled rectangle and rounded rectangle and filled rounded rectangle with any two colors?
   C) Write a java program to draw a smiley face?

4. A) Write a Java program to demonstrate the mouse event handlers.
   B) Write a Java program to demonstrate the key event handlers.

5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Suggested Readings:

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.
3. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.

Course Name: Cloud Computing

Course Code: CSEE14015

Course Outline:

Unit I
Definition, essential characteristics of cloud computing, history of cloud. NIST reference model – Actors, Cloud orchestration, service models, SLA, deployment models. Applications of cloud, popular cloud platforms.

Unit II
Virtualization- Introduction, Hypervisor and types, Full virtualization, Paravirtualization, Hardware virtualiza- tion, Introduction to various hypervisors, VM in cloud.
Resource virtualization- Paging in virtualization, Network virtualization, storage virtualization.

Unit III
Container – Containers introduction, difference between virtualization and containerization, Linux containers, Docker Architecture, Docker Images, Docker Hub, Creation of Docker container, Container orchestration, Ku-bernete

Unit IV
Storage in cloud- Object storage, Cloud SQL ,
Networking in cloud- Advantages, Virtual
private cloud.
Application development in cloud – Environments, Microservice architecture, Develop and deploy cloud appli-cations using a MERN stack, monitoring and load balancing.

Unit V
Cloud and machine learning, Bigdata analytics, Role of IoT in the cloud, machine learning frameworks for cloud,Security and privacy issues in cloud computing

Suggested Readings:

1. RajkumarBuyya, Christian Vecchiola and ThamariSelvi S, "Mastering in Cloud Computing", McGraw
2. Hill Education (India) Private Limited, 2013.
3. Dan C. Marinescu, Cloud Computing: Theory and Practice, Elsevier Science, Edition 2022

Course Name: Software Verification and Validation

Course Code: CSEE14017

Objectives

- This course makes students understand the concepts and theory related to software testing. Understand different testing techniques used in designing test plans, developing test suites, and evaluating test suite coverage. Understand how software developers can integrate a testing framework into code development in order to incrementally develop and test code.

Course Outline:

Unit I : Introduction
Terminology, error, fault and failures, design for testability, objectives, principles, Purpose of testing, testing and debugging.

Unit II : Limitations
Theoretical foundations: impracticality of testing all data, impracticality of testing all paths, no absolute proof of correctness.
Role of V&V in Software Evolution: Types of Products: requirements, specifications, designs, implementations, changes, V&V objectives: correctness, consistency, necessity, sufficiency, performance.

Testing Techniques and Strategies: Static and dynamic testing, software technical reviews, Software testing: levels of testing - module, integration, system, regression, Testing techniques and their applicability-functional testing and analysis, structural testing and analysis, error-oriented testing and analysis, hybrid approaches, integration strategies, transaction flow analysis, stress analysis, failure analysis, concurrency analysis, performance analysis.

Unit III: Flow graphs and Path Testing
Path Testing Basics, Path Predicates, Application of Path Testing.
Transaction Flow Testing: Generalizations, Transaction Flows, Transaction-Flow testing techniques.

Data Flow Testing: Basics, Data flow model, Data flow testing strategies, Applications.

Unit IV: Software Testing and Regular Expression
Path products, path sums, Loops, Reduction procedure, Applications, Approximate number of paths, The mean processing time of any routine, Regular expression and Flow-anomaly detection.

Program Mutation Testing: Introduction, Mutation and mutants, Mutation operators, Equivalent mutants, Fault detection using mutants, Types of mutants, Mutation operators for C and Java.

Laboratory Work: Developing various exercises like cyclomatic complexity, boundary value analysis and data flow testing etc. Developing a small project/tool to generate test data, to execute test data etc. Exposure to automated testing tool;

Suggested Readings:

1. Boris Beizer, Software Testing Techniques, John Wiley & Dreamtech(2002).
2. William Perry, Effective Methods for Software Testing, John Wiley & Sons, Inc. (2006) 3rd edition
3. Aditya P. Mathur, Foundations of Software Testing, Pearson Education (2008).
4. Glenford J. Myers, The Art of Software Testing, Wiley India Pvt. Ltd 2nd edition (2006).

Course Name: Ability and Skill Enhancement - VI

Course Code: SEC077006

Course Outline – Final Assessment – Report/Presentation

Unit I: Verbal Reasoning & English Aptitude
Logical Sequence of Words, Verbal Analogy, Classification, Blood Relation Test, Syllogism, Reading Comprehension.

Unit II: Winning Attitude
Attitude is the most important thing for success, how to develop a winning attitude, what is it, when we need it, what is mindset, how to have a winning and positive mindset, how to win in difficult situations, Positive thinking, passion, dedication, confidence, well preparation, focus, hard work, planning, never give up, etc - some traits that help in developing winning attitude.

Unit III: Understanding the News
Reading Current News, Comparing & Analysing the news, Write an editorial, News Vocabulary, Presentation on any major news (political/social/sports/economics).

Unit IV: Be a Journalist
Chat Show, Panel Discussion, Parliamentary debate, News Inspired Theatrical Performance.

Unit V: Report
Preparing a report on major National/International News – Insights/ review of major newspapers and news channels.

Course Name: Database Administration with Oracle

Course Code: CSEE14005

Course Outline:

Unit I: Introduction to Oracle Database Administration

Oracle Database Overview
Oracle Database Architecture: SGA, PGA, and Background Processes
Oracle Database Installation and Configuration
Tools for DBA: SQL*Plus, RMAN, and Oracle Enterprise Manager

Unit II: Database Storage and Management

Tablespaces and Datafiles, Managing Segments, Extents, and Blocks, Managing Undo Tablespaces
Oracle ASM (Automatic Storage Management)

Unit III: Backup and Recovery Strategies

Backup Types: Full, Incremental, and Cumulative, Recovery Manager (RMAN): Configuration and Usage, Performing Database Recovery, Flashback Technologies: Flashback Table, Query, and Database

Unit IV: Performance Tuning and Optimization

Understanding Database Performance Issues, Using Oracle Performance Tuning Tools: AWR, ADDM, and TKPROF, Optimizing Queries and Indexes ,Managing Database Resources with Resource Manager

Unit V: User Management and Security

Creating and Managing Users, Assigning Roles and Privileges, Auditing and Security Policies
Database Encryption Techniques

Course Name: Database Administration with IBM DB2

Course Code: CSEE14006

Course Outline:

Unit I: Introduction to IBM DB2

Overview of IBM DB2, Features, and Editions,IBM DB2 Database Architecture,Installation and Configuration of IBM DB2, DB2 Tools: Command Line Processor (CLP), IBM Data Studio

Unit II: Database Objects and Storage Management

Tablespaces, Buffer Pools, and Containers, Tables, Views, and Indexes in DB2, Partitioning and Clustering in DB2, Database Storage Structures and Optimization

Unit III: Backup, Recovery, and High Availability

DB2 Backup Strategies: Online, Offline, Incremental,Database Recovery and Rollforward Operations, High Availability and Disaster Recovery in DB2, Using DB2 HADR (High Availability Disaster Recovery)

Unit IV: Performance Tuning and Optimization
DB2 Query Optimization Techniques, Indexing Strategies and Performance Monitoring, DB2 Explain and Visual Explain Tools , Using DB2 Workload Manager for Resource Management
Unit V: Security, User Management, and Auditing
Creating and Managing Users, Roles, and Permissions, Security Policies and Encryption Techniques in DB2, Auditing in DB2: Activity Monitoring and Compliance, Configuring Authentication and Authorization

Course Name: Data warehouse and Data Mining

Course Code: CSEE14009

Course Outline:

Unit I: Introduction to Data Warehousing
Definition and Characteristics of Data Warehouses, OLAP vs OLTP, Data Warehouse Architecture (Basic, Business, Virtual), Data Marts, Metadata, ETL (Extract, Transform, Load) Process
Schema Design: Star, Snowflake, and Fact Constellation
Unit II: OLAP and Data Preprocessing, OLAP Operations: Roll-up, Drill-down, Slice, Dice, Pivot
Data Preprocessing: Cleaning, Integration, Transformation, Reduction, Data Discretization and Concept Hierarchy Generation
Unit III: Introduction to Data Mining, Definition, Applications, and Challenges of Data Mining
Association Rule Mining: Apriori and FP-Growth Algorithms, Classification Techniques: Decision Trees, Naïve Bayes, k-NN, Clustering Methods: K-Means, Hierarchical Clustering, DBSCAN
Unit IV: Advanced Data Mining Techniques, Neural Networks and Deep Learning in Data Mining
Support Vector Machines and Random Forests, Mining Streaming, Spatial, and Multimedia Data
Text and Web Mining
Unit V: Applications and Trends in Data Mining, Business Intelligence and Data Analytics, Ethical and Privacy Issues in Data Mining, Big Data Analytics and Machine Learning Integration
Case Studies in Data Warehousing and Mining

Course Name: Network Programming

Course Code: CSEE14010

Course Outline:

Unit I: Introduction to Network Programming

Basics of Networking: OSI & TCP/IP Models, Introduction to Sockets and Ports,Client-Server Communication Model, IPv4 and IPv6 Addressing, Data Transmission: TCP vs. UDP

Unit II: Socket Programming in C/Python

Creating and Binding Sockets, TCP Socket Programming (Connection-Oriented Communication) ,UDP Socket Programming (Connectionless Communication), Socket Options and Error Handling Concurrent Server Handling with Threads

Unit III: Advanced Network Programming

Non-Blocking I/O and Multiplexing (select, poll, epoll), Remote Procedure Calls (RPC)

HTTP and RESTful API Communication, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Packet Sniffing and Traffic Analysis

Unit IV: Network Performance and Security

Performance Optimization Techniques in Network Programming, Measuring Latency and Bandwidth, Encryption and Authentication Mechanisms, Firewalls, VPNs, and Secure Communication, Case Study: Secure Client-Server Implementation

Unit V: Real-World Applications and Trends

Cloud Networking Concepts, Network Automation using Python, SDN (Software Defined Networking) and NFV (Network Function Virtualization), IoT Networking and Wireless Protocols, Future Trends in Network Programming

Course Name: Advanced Data Structures

Course Code: CSEE14011

Course Outline:

Unit I: Introduction to Advanced Data Structures

Review of Basic Data Structures (Arrays, Linked Lists, Stacks, Queues), Amortized Analysis and Complexity

Persistent Data Structures, Skip Lists

Unit II: Balanced Trees

AVL Trees: Rotations and Operations, Red-Black Trees: Properties and Insert/Delete Operations

B-Trees and B+ Trees: Searching and Insertion, Tries and Suffix Trees

Unit III: Heaps and Hashing

Binary Heaps: Min Heap and Max Heap, Fibonacci Heaps and Pairing Heaps, Hashing Techniques: Open Addressing and Chaining, Bloom Filters

Unit IV: Graph Algorithms

Representation of Graphs (Adjacency List & Matrix), Depth-First Search (DFS) and Breadth-First Search (BFS), Shortest Path Algorithms: Dijkstra's and Bellman-Ford, Minimum Spanning Tree: Kruskal's and Prim's Algorithms, Network Flow and Matching

Unit V: Applications and Advanced Topics

Dynamic Graph Algorithms, Persistent and External Data Structures, String Matching Algorithms (KMP, Rabin-Karp, Aho-Corasick), Advanced Cache-Efficient and Parallel Data Structures

Course Name: Advanced Database Management System

Course Code: CSEE14012

Course Outline:

Unit I: Advanced Database Models and Architectures

Review of Relational Database Management Systems (RDBMS), Object-Oriented and Object-Relational Databases, XML and JSON Databases, Introduction to Graph Databases, NewSQL vs NoSQL Databases

Unit II: Query Processing and Optimization

Query Parsing and Execution Plans, Indexing and Hashing Techniques, Cost-Based Query Optimization

Materialized Views and Query Caching, Advanced SQL Queries and Stored Procedures

Unit III: Transaction Management and Concurrency Control

ACID Properties and Serializability, Concurrency Control Techniques: Locking, Timestamping, MVCC

Deadlock Detection and Prevention, Distributed Transactions and Two-Phase Commit, Case Study: Real-World Transaction Management Systems

Unit IV: Distributed and NoSQL Databases

Distributed Database Architecture, CAP Theorem and BASE Properties, NoSQL Databases: Key-Value, Document, Column-Family, Graph, Data Replication and Sharding Strategies, MongoDB, Cassandra, and Neo4j Overview

Unit V: Database Security and Recovery

Authentication and Access Control in Databases, SQL Injection and Prevention Mechanisms, Backup and Recovery Techniques, Blockchain for Database Security, Case Studies on Database Failures and Recovery

Course Name: Linux Administration and Shell Programming
Course Code: CSEE14013

Course Outline:

Unit I: Introduction to Linux Operating System

Linux Architecture and Kernel Basics, Linux File System and Directory Structure, Basic Linux Commands and File Manipulation, User and Group Management, Process Management and Job Control

Unit II: System Administration

Boot Process and System Initialization, Package Management (RPM, YUM, APT),Disk Partitioning and File System Management, System Performance Monitoring and Logging, Backup and Restore Mechanisms

Unit III: Shell Scripting

Introduction to Shell Programming (Bash, Korn, C-Shell)Variables, Operators, and Control Structures

, Functions and Looping Constructs, File Handling and String Processing, Scheduling Jobs with Crontab and At

Unit IV: Linux Networking and Security

Network Configuration and Troubleshooting, Firewall and IPTables, Secure Shell (SSH) and File Transfer (SCP, SFTP), User Permissions and Access Control Lists (ACLs), SELinux and Linux Security Best Practices

Unit V: Advanced Topics and Troubleshooting

Automating System Administration Tasks, Performance Tuning and Optimization, Debugging and System Recovery, Virtualization and Containerization (Docker, LXC), Case Study: Real-World Linux Deployment

Course Name: Wireless Networks
Course Code: CSEE14014

Course Outline:

Unit I: Introduction to Wireless Communication

Fundamentals of Wireless Communication, Wireless Propagation Models and Signal Fading, Modulation Techniques: FDMA, TDMA, CDMA, OFDM, Cellular Concept and Frequency Reuse Wireless Standards: IEEE 802.11, 802.15, 802.16, LTE

Unit II: Wireless Network Architectures and Protocols

Infrastructure and Ad-Hoc Wireless Network, MAC Layer Protocols for Wireless Network, Routing in

Wireless Networks: Proactive vs Reactive Protocol, TCP over Wireless Network, Energy-Efficient Protocols for Wireless Communication

Unit III: Wireless Network Security

Security Issues in Wireless Network, Authentication Mechanisms in Wi-Fi Network, Wireless Encryption Standards: WEP, WPA, WPA2, WPA3, Attacks on Wireless Networks: Eavesdropping, DoS, MITM, Secure Mobile and Wireless Transactions

Unit IV: Wireless Network Configuration and Optimization

Wi-Fi Network Deployment and Optimization, Performance Metrics and QoS in Wireless Networks Interference and Channel Allocation Strategies, Mobility Management in Wireless Networks, Tools for Wireless Network Monitoring

Unit V: Emerging Trends in Wireless Networks

Internet of Things (IoT) and Wireless Sensor Networks, 5G Networks and Beyond
Cognitive Radio and Dynamic Spectrum Access, Wireless Mesh Networks and Smart Cities
Future Challenges in Wireless Communication

Course Name: Software Reuse
Course Code: CSEE14016

Course Outline:

Unit I: Introduction to Software Reuse

Definition, Need, and Benefits of Software Reuse, Levels of Reuse: Code, Design, Architecture, Requirements, Challenges and Barriers in Software Reuse, Software Reuse Economics and Cost-Benefit Analysis, Open-Source Software Reuse

Unit II: Approaches and Techniques for Software Reuse

Component-Based Software Development (CBSD), Object-Oriented Reuse and Inheritance, Design Patterns and Frameworks for Reuse, Generative Programming and Domain Engineering, Reusable Software Components and Libraries

Unit III: Software Reuse in Software Development Life Cycle (SDLC)

Reuse in Software Requirements Engineering, Reuse in Design and Architecture, Reuse in Coding and Implementation, Reuse in Testing and Maintenance, Tools and Techniques for Automating Reuse

Unit IV: Software Product Lines (SPL) and Reuse

Software Product Line Engineering (SPLE), Feature-Oriented Software Development (FOSD), Domain-Specific Languages (DSLs) for Reuse, Reuse Metrics and Quality Assurance, Case Studies on Successful Software Product Lines

Unit V: Future Trends and Challenges in Software Reuse

AI and Machine Learning in Software Reuse, Cloud-Based Reusable Components and Services, Software-as-a-Service (SaaS) and API Reuse, Security and Legal Issues in Software Reuse, Future Challenges and Research Directions

Course Name: Software Design and Construction
Course Code: CSEE14018

Course Outline:

Unit I: Fundamentals of Software Design

Introduction to Software Engineering and Software Development Life Cycle (SDLC), Software Design Principles: Cohesion, Coupling, Modularity, and Abstraction, Design Thinking in Software Development, Software Development Models: Waterfall, Agile, and DevOps, Role of Prototyping in Software Design

Unit II: Software Architecture and Design Patterns

Introduction to Software Architecture and Design Patterns, Architectural Styles: Layered, Client-Server, Microservices, and Event-Driven,Object-Oriented Design Principles (SOLID), Common Design Patterns: Singleton, Factory, Observer, MVC,Case Studies on Architectural Design

Unit III: Software Construction and Best Practices

Code Structuring and Documentation Standards, Version Control Systems (Git, SVN) and CI/CD Pipelines, Error Handling, Debugging, and Exception Handling, Performance Optimization Techniques, Secure Coding Practices and Threat Modeling

Unit IV: Software Testing and Quality Assurance

Importance of Software Testing in Construction,Unit Testing, Integration Testing, System Testing, and Regression Testing, Test-Driven Development (TDD) and Behavior-Driven Development (BDD), Static and Dynamic Code Analysis, Quality Metrics and Software Reliability

Unit V: Software Maintenance and Evolution

Software Maintenance Models and Challenges, Refactoring for Performance and Maintainability, Reverse Engineering and Reengineering, Software Metrics for Measuring Performance, Future Trends in Software Design and Construction

Course Name: Software Quality Management
Course Code: CSEE14019

Course Outline:

Unit I: Introduction to Software Quality

Definition and Importance of Software Quality, Software Quality Models: McCall's Model, Boehm's Model, Dromey's Model, Software Quality Attributes and Metrics
Cost of Software Quality (COQ), Quality Planning and Risk Management

Unit II: Software Quality Assurance (SQA)

Software Quality Assurance Activities, Role of Software Testing in Quality Management, Testing Techniques: White-Box, Black-Box, and Grey-Box Testing, Defect Tracking and Management, Automated Testing and Continuous Integration

Unit III: Software Process Improvement Models

Software Process Models (Waterfall, Agile, DevOps), Capability Maturity Model

Integration (CMMI),ISO 9001 for Software Quality, Six Sigma in Software Quality, Key Performance Indicators (KPIs) for Quality Measurement

Unit IV: Software Quality Standards and Compliance

Software Quality Standards: IEEE, ISO, CMMI, Auditing and Compliance in Software Quality, Quality Management Tools and Techniques,Software Configuration Management, Case Studies on Quality Assurance in Software Industry

Unit V: Emerging Trends in Software Quality Management

AI and Machine Learning in Software Quality Assurance, DevOps and Continuous Testing, Security and Reliability Testing, Quality Challenges in Large-Scale Software Development, Future of Software Quality and Process Automation

Course Name: Aspect Oriented Programming
Course Code: CSEE14020

Course Outline:

Unit I: Introduction to Aspect-Oriented Programming (AOP)

Fundamentals of Object-Oriented Programming (OOP) and its Limitations,Introduction to Aspect-Oriented Programming,Key Concepts: Cross-Cutting Concerns, Join Points, Pointcuts, Advice, AOP vs OOP: Comparison and Benefits, AOP Frameworks: AspectJ, Spring AOP

Unit II: AOP Concepts and Implementation

Understanding Join Points and Pointcuts,Types of Advice: Before, After, Around
Weaving: Compile-Time, Load-Time, and Run-Time Weaving,AspectJ Syntax and Annotations, Case Study: Logging and Transaction Management using AOP

Unit III: AOP in Software Design and Development

Separation of Concerns and Code Modularity, Applying AOP in Enterprise Applications
Dependency Injection and Inversion of Control (IoC),AOP in Service-Oriented Architecture (SOA),Performance Overhead and Trade-offs of AOP

Unit IV: AOP in Integration with OOP and Frameworks

Integrating AOP with Java, Spring Framework, and Hibernate,AspectJ vs Spring AOP: Key Differences,AOP for Exception Handling and Security,Using AOP in Microservices Architecture,Best Practices for AOP Implementation

Unit V: Advanced Topics and Future Trends in AOP

Debugging and Testing AOP-Based Applications,Dynamic Proxying and Bytecode Manipulation,Security Implications and Code Auditing with AOP, AOP in Cloud Computing and Distributed Systems, Research Trends and Future Directions in AOP

Course Name: Data Visualization
Course Code: CSEE14034

Course Outline

Unit I: Value of Visualization – What is Visualization and Why do it: External representation – Interactivity – Difficulty in Validation. Data Abstraction: Dataset types – Attribute types – Semantics. Task Abstraction – Analyze, Produce, Search, Query. Four levels of validation – Validation approaches – Validation examples. Marks and Channels

Unit II: Rules of thumb – Arrange tables: Categorical regions – Spatial axis orientation – Spatial layout density. Arrange spatial data: Geometry – Scalar fields – Vector fields – Tensor fields. Arrange networks and trees: Connections, Matrix views – Containment. Map color: Color theory, Color maps and other channels.

Unit III- Manipulate view: Change view over time – Select elements – Changing viewpoint – Reducing attributes. Facet into multiple views: Juxtapose and Coordinate views – Partition into views – Static and Dynamic layers – Reduce items and attributes: Filter – Aggregate. Focus and context: Elide – Superimpose – Distort – Case studies.

Course Name: Data Visualization Lab
Course Code: CSEE14035

Course Outline:

Laboratory work:

1. Introduction to various Data Visualization tools
2. Basic Visualization in Python
3. Basic Visualization in R
4. Introduction to Tableau and Installation
5. Connecting to Data and preparing data for visualization in Tableau
6. Data Aggregation and Statistical functions in Tableau
7. Data Visualizations in Tableau
8. Basic Dashboards in Tableau

Course Name: Big Data Analytics
Course Code: CSEE14036

Course Outline:

Unit I : INTRODUCTION TO BIG DATA AND HADOOP Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

Unit II : HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and

Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Unit III : Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit IV : Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

UNIT V : Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

Course Name: Software Verification and Validation
Course Code: CSEE14037

Course Outline:

Unit I : Introduction

Terminology, error, fault and failures, design for testability, objectives, principles, Purpose of testing, testing and debugging.

Unit II : Limitations

Theoretical foundations: impracticality of testing all data, impracticality of testing all paths, no absolute proof of correctness.Role of V&V in Software Evolution: Types of Products: requirements, specifications, designs, implementations, changes, V&V objectives: correctness, consistency, necessity, sufficiency, performance.

Testing Techniques and Strategies: Static and dynamic testing, software technical reviews, Software testing: levels of testing - module, integration, system, regression, Testing techniques and their applicability-functional testing and analysis, structural testing and analysis, error-oriented testing and analysis, hybrid approaches, integration strategies, transaction flow analysis, stress analysis, failure analysis, concurrency analysis, performance analysis.

Unit III: Flow graphs and Path Testing

Path Testing Basics, Path Predicates, Application of Path Testing.

Transaction Flow Testing: Generalizations, Transaction Flows, Transaction-Flow testing techniques.

Data Flow Testing: Basics, Data flow model, Data flow testing strategies, Applications.

Unit IV: Software Testing and Regular Expression

Path products, path sums, Loops, Reduction procedure, Applications, Approximate number of paths, The mean processing time of any routine, Regular expression and Flow-anomaly detection.

Program Mutation Testing: Introduction, Mutation and mutants, Mutation operators, Equivalent mutants, Fault detection using mutants, Types of mutants, Mutation operators for C and Java.

Laboratory Work: Developing various exercises like cyclomatic complexity, boundary value

analysis and data flow testing etc. Developing a small project/tool to generate test data, to execute test data etc. Exposure to automated testing tool;

Suggested Readings:

1. Boris Beizer, Software Testing Techniques, John Wiley & Dreamtech(2002).
2. William Perry, Effective Methods for Software Testing, John Wiley & Sons, Inc. (2006) 3rd edition
3. Aditya P. Mathur, Foundations of Software Testing, Pearson Education (2008).
4. Glenford J. Myers, The Art of Software Testing, Wiley India Pvt. Ltd 2ndedition (2006

9. Lesson Plans

CSEC14350– Theory of Computation

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Finite State Machine		
Unit-I	Recursive definitions, Regular Expressions, definitions of Finite State Machine, Transition Graphs	C-1	Lecture
Unit-I	Deterministic & Non Deterministic	C-2	Lecture
Unit-I	Finite State Machines,	C-3	Lecture
Unit-I	Thomson's & Subset Algorithm to convert regular Expression to NDFSM & NDFSM to FSM	C-4	Lecture
Unit-I	Thomson's & Subset Algorithm to convert regular Expression to NDFSM & NDFSM to FSM	C-5	Lecture
Unit-I	Thomson's & Subset Algorithm to convert regular Expression to NDFSM & NDFSM to FSM	C-6	Lecture
Unit-I	Regular Grammar left linear and right linear.	C-7	Lecture
Unit-I	Finite State Machine with output (Moore machine and Melay Machine)	C-8	Lecture
Unit-I	Conversion of Moore machine to Melay Machine & Vice-Versa,	C-9	Lecture
Unit-I	Conversion of Moore machine to Melay Machine & Vice-Versa,	C-10	Lecture
Unit-I	Pumping Lemma, Properties and limitations of finite state machine	C-11	Lecture
Unit-I	Presentation 1	C-12	Presentation
Unit-I	Clarification Class 1	C-13	Clarification Class
	Take Home Assignments 1		Take Home Assignments
	Activity 1	C-14	Activity
Unit-II	Context free Grammar design	C-15	Lecture
Unit-II	Normal Form CNF, GNF	C-16	Lecture
Unit-II	Push down Stock machine, Context free Grammar	C-17	Lecture
Unit-II	Presentation 2	C-18	Presentation
Unit-II	Properties of context free grammar: Union, Closure & Intersection, Pumping lemma for context free grammar	C-19	Lecture
Unit-II	Properties of context free grammar: Union, Closure & Intersection, Pumping lemma for context free grammar	C-20	Lecture
Unit-II	Webinar 1	C-21	Webinar
Unit-II	Take Home Assignments 2		Take Home Assignments
Unit-II	Parser Design and Push Down stock machine, CYK algorithm, Earley's Algorithm	C-22	Lecture
Unit-II	Clarification Class 2	C-23	Clarification Class
Unit-II	Class Room Assignment 1	C-24	Class Room

			Assignment
Unit-III	Turing machine, Post machine,	C-25	Lecture
Unit-III	Conversion of Turing to Post-Wang and vice versa, Combining Turing machine, Chomsky Hierarchy.	C-26	Lecture
Unit-III	Conversion of Turing to Post-Wang and vice versa, Combining Turing machine, Chomsky Hierarchy.	C-27	Lecture
Unit-III	Presentation 3	C-28	Presentation
Unit-III	Conversion of Turing to Post-Wang and vice versa, Combining Turing machine, Chomsky Hierarchy.	C-29	Lecture
Unit-III	Church's Thesis, Primitive Recursion Functions, Godelization, Universal Turing machine	C-30	Lecture
Unit-III	Take Home Assignments 3		Take Home Assignments
Unit-III	Clarification Class 3	C-31	Clarification Class
Unit-III	Class Room Assignment 2	C-32	Class Room Assignment
Unit-IV	Halting Problem, Turing Enumerability, Turing Acceptability and Turing Decidabilities.	C-33	Lecture
Unit-IV	Halting Problem, Turing Enumerability, Turing Acceptability and Turing Decidabilities.	C-34	Lecture
Unit-IV	Guest lecture 1	C-35	Guest lecture
Unit-IV	Class Room Assignment 3	C-36	Class Room Assignment
Unit-IV	Webinar 2	C-37	Webinar
Unit-IV	Unsolvable problems about Turing machines,	C-38	Lecture
Unit-IV	Unsolvable problems about Grammar and similar system Computation Complexity: P, NP and NP complete problems	C-39	Lecture
Unit-IV	Guest lecture 2	C-40	Guest lecture
Unit-IV	Unsolvable problems about Grammar and similar system Computation Complexity: P, NP and NP complete problems	C-41	Lecture
Unit-IV	Presentation 4	C-42	Presentation
Unit-IV	Seminar	C-43	Seminar
Unit-IV	Class Room Assignment 4	C-44	Class Room Assignment
Unit-IV	Clarification Class 4	C-45	Clarification Class

CSEC14351– Theory of Computation Lab

S. No.	Particulars	Class No.	Pedagogy of Class
1	Create a Deterministic Finite Automata (DFA) for the following problems. State the 5 Tuples of the DFA.	P-1,2	Practical
2	Construct the Transition Diagram for the DFA as well as Program to convert Non-deterministic finite automaton (NFA) to Deterministic finite automaton (DFA)	P-3,4	Practical
3	Program to generate lexical tokens	P-5,6	Practical
4	Algorithm:·Declare an array of characters, as buffer to store the tokens ,that is,'lexbuffer'; ·Get token from user put it into character type of variable, say 'c'. ·If 'c' is blank then do nothing. ·If 'c' is new line character line=line+1. ·If 'c' is digit, set token_val ,the value assigned for a digit and return 'NUMBER'. ·If 'c' is proper token then assign the token value. Print the complete table with oToken entered by the user oAssociated token value.	P-7,8	Practical
5	Study of LEX/FLEX tool	P-9,10	Practical
6	Write LEX /FLEX program to identify tokens: integer numbers, decimal numbers.	P-11,12	Practical
7	Write LEX /FLEX program to identify tokens: identifiers, keywords.	P-13,14	Practical
8	Write LEX /FLEX program to identify tokens: arithmetic operators, relational operators.	P-15,16	Practical
9	Write LEX /FLEX program to identify tokens: relational operators.	P-17,18	Practical
10	Write LEX /FLEX program to identify tokens: relational operators.	P-19,20	Practical
11	Program to implement any one code optimization technique.	P-21,22	Practical
12	Program to implement any one code optimization technique.	P-23,24	Practical
13	Clarification Class	P-25,26	Clarification Class
14	Test	P-27,28	Test
15	Activity	P-29,30	Activity

CSEC14352 -.NET Technologies

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Microsoft .net Platform, Design Goals and Overview	C-1	Lecture
Unit-I	Common Language Runtime: CLR Environment and Executables	C-2	Lecture
Unit-I	Metadata, Assemblies, Intermediate Language	C-3	Lecture
Unit-I	CLR Execution, CLR Functions, CLR Structure.	C-4	Lecture
Unit-I	Programming in .net Framework: Common Programming Model	C-5	Lecture
Unit-I	Features and Languages, Language Integration, Framework Class Library	C-6	Lecture
Unit-I	.net Framework Components: Deployment options, Distributed components, COM+ services, Message queuing.	C-7	Lecture
Unit-I	Clarification Class-1	C-8	Clarification Class
	Take Home Assignments-1		Take Home Assignments
	Class Room Assignment-1	C-9	Class Room Assignment
	Presentation-1	C-10	Presentation
Unit- II	The Basics and Console Applications in C#: Name Spaces - Constructor and Destructors	C-11	Lecture
Unit- II	Function Overloading & Inheritance	C-12	Lecture
Unit- II	Operator Overloading, Modifiers - Property and Indexers, Attributes & Reflection API	C-13	Lecture
Unit- II	When to use Console Applications - Generating Console Output, Processing Console Input	C-14	Lecture
Unit- II	C#.NET: Language Features and Creating .NET Projects, Namespaces Classes and Inheritance	C-15	Lecture
Unit- II	Namespaces Classes and Inheritance, C, Exploring the Base Class Library -, Debugging and Error Handling	C-16	Lecture
Unit- II	Data Types, Exploring Assemblies and Namespaces, String Manipulation	C-17	Lecture
Unit- II	Files and I/O, Collections	C-18	Lecture
Unit- II	Clarification class-2	C-19	Clarification Class
	Take Home Assignments-2		Take Home Assignments
	Class Room Assignment-2	C-20	Class Room Assignment
	Presentation-2	C-21	Presentation
	Quiz-1	C-22	Quiz
Unit -III	ADO.NET Architecture, Benefits of ADO.NET, ADO.NET compared to classic ADO	C-23	Lecture
Unit -III	Datasets, Managed Providers, Data Binding: Introducing Data Source Controls	C-24	Lecture
Unit -III	Reading and Write Data Using the Sql Data Source Control	C-25	Lecture

Unit -III	Windows Forms and Controls in details: The Windows Forms Model, Creating Windows Forms Windows Forms Properties and Events	C-26	Lecture
Unit -III	Windows Form Controls, Menus - Dialogs – ToolTips	C-27	Lecture
Unit -III	Visual Inheritance in C#.NET: Apply Inheritance techniques to Forms	C-28	Lecture
Unit -III	Creating Base Forms	C-29	Lecture
Unit -III	Clarification class-3	C-30	Clarification Class
Unit -III	Take Home Assignments-3		Take Home Assignments
	Class Room Assignment-3	C-31	Class Room Assignment
	Webinar-1	C-32	Webinar
	Workshop	C-33	Workshop
	Presentation-3	C-34	Presentation
	Activity-1-Mind Mapping	C-35	Activity
Unit- IV	Web services in practice, Web services Framework, Provider, Customer and Security	C-36	Lecture
Unit- IV	Web forms: ASP, ASP.NET, Web Form syntax	C-37	Lecture
Unit- IV	Data binding, Use of templates	C-38	Lecture
Unit- IV	State management and scalability, Application development	C-39	Lecture
Unit- IV	Class Room Assignment-4	C-40	Class Room Assignment
Unit- IV	ASP.NET and Web services	C-41	Lecture
Unit- IV	Windows forms: Introduction, System. Windows, Forms Namespace, Windows Forms development	C-42	Lecture
Unit- IV	Windows Forms and Web services	C-43	Lecture
Unit- IV	Presentation-4	C-44	Presentation
	Clarification Class-4	C-45	Clarification Class

CSEC14353 -.NET Technologies Lab

S. No.	Particulars	Class No.	Pedagogy of Class
1	Installation of Visual Studio 2019	P-1,2	Practical
2	Simple application using web controls	P-3,4	Practical
3	Program to display the simple calculator using windows application. Deploy the program as a setup.	P-5,6	Practical
4	Finding factorial Value a. Money Conversion b. Quadratic Equation c. Temperature Conversion d. Login control	P-7,8	Practical
5	Adrotator Control	P-9,10	Practical
6	Calendar control a. Display messages in a calendar control b. Display vacation in a calendar control c. Selected day in a calendar control using style d. Difference between two calendar dates	P-11,12	Practical
7	Activity 01	P-13,14	Practical
8	Treeview control a. Treeview control and data list b. Treeview operations	P-15,16	Practical
9	Validation controls, Query textbox and Displaying records, Display records by using database, Data list link control	P-17,18	Activity
10	Data binding using drop down list control, Inserting record into a database, Deleting record into a database, Data binding using data list control, Data list control templates	P-19,20	Practical
11	Activity 02	P-21,22	Activity
12	Data binding using data grid, Data-grid control template, Data grid hyperlink	P-23,24	Practical
13	Data grid button column, Data List event Data grid paging	P-25,26	Practical
14	Test	P-27,28	Test
15	Creating own table format using data grid	P-29,30	Practical

CSEC14354-Internet of Things (IOT)

Unit	Particulars	Class No.	Pedagogy of Class
Unit- I	What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges		
Unit- I	IoT-Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures	C-1	Lecture
Unit- I	A Simplified IoT Architecture, The Core IoT Functional Stack	C-2	Lecture
Unit- I	IoT Data Management and Compute Stack	C-3	Lecture
Unit- I	Class Room Assignment	C-4	Class Room Assignment
	Clarification Class	C-5	Clarification Class
Unit-II	Smart Objects: The "Things" in IoT		
Unit-II	Sensors	C-6	Lecture
	Activity	C-7	Activity
	Take Home Assignments		Take Home Assignments
	Presentation	C-8	Presentation
Unit-II	Actuators	C-9	Lecture
Unit-II	Smart Objects	C-10	Lecture
Unit-II	Sensor Networks	C-11	Lecture
Unit-II	Connecting Smart Objects	C-12	Lecture
Unit-II	Communications Criteria	C-13	Lecture
Unit-II	IoT Access Technologies	C-14	Lecture
Unit-II	Presentation	C-15	Presentation
Unit-II	IoT Access Technologies	C-16	Lecture
Unit-II	Smart City IoT Architecture	C-17	Lecture
Unit-II	Smart City IoT Architecture	C-18	Lecture
	Clarification Class	C-19	Clarification Class
Unit-III	Protocols for IoT		
Unit-III	Protocols for IoT Network Layer	C-20	Lecture
Unit-III	The need for Optimization	C-21	Lecture
Unit-III	Optimizing IP for IoT	C-22	Lecture
	Webinar	C-23	Webinar
	Class Room Assignment	C-24	Class Room Assignment
	Presentation	C-25	Presentation
	Take Home Assignments		Take Home Assignments
	Seminar	C-26	Seminar
	Guest Lecture	C-27	Guest lecture
Unit-III	Profiles and Compliances	C-28	Lecture
Unit-III	Application Protocols for IoT	C-29	Lecture
Unit-III	The Transport Layer	C-30	Lecture
Unit-III	The Transport Layer	C-31	Lecture
Unit-III	IoT Application Transport Methods	C-32	Lecture
Unit-III	IoT Application Transport Methods	C-33	Lecture

	Clarification Class	C-34	Clarification Class
	Presentation	C-35	Presentation
	Class Room Assignment	C-36	Class Room Assignment
	Take Home Assignments		Take Home Assignments
Unit-IV	Data and Network Analytics in IoT		
Unit-IV	An Introduction to Data Analytics for IoT, Machine Learning, Network Analytics, Securing IoT	C-37	Lecture
Unit-IV	Machine Learning, Network Analytics, Securing IoT	C-38	Lecture
Unit-IV	A Brief Historyof OT Security	C-39	Lecture
Unit-IV	Common Challenges in OT Security, IT and OT Security Practices.	C-40	Lecture
Unit-V	IoT Physical Devices and Endpoints. IoT Physical Devices and Endpoints - RaspberryPi	C-41	Lecture
Unit-V	Introduction to Rasp-berryPi, About the RaspberryPi Board: Hardware Layout	C-42	Lecture
Unit-V	Operating Systems on RaspberryPi, Configuring RaspberryPi, Connecting Raspberry Pi via SSH	C-43	Lecture
Unit-V	Class Room Assignment	C-44	Class Room Assignment
	Clarification Class	C-45	Clarification Class

CSEE14007–Advanced Java

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	INTRODUCTION TO WEB TECHNOLOGIES		
Unit-I	History of the web, Understanding Web System Architecture, Understanding 3-tier Web Architecture, Overview of HTTP, Introducing HTML document structure, Creating Headings on a web page	C-1	Lecture
Unit-I	Working with links, Creating a Paragraph, Working with images (Hot Spots)	C-2	Lecture
Unit-I	Working with tables, working with frames	C-3	Lecture
Unit-I	Introduction to Forms and HTML controls. Inline, External, Internal, Style class, Multiple styles	C-4	Lecture
Unit-I	Clarification Class	C-5	Clarification Class
Unit-I	Class Room Assignment	C-6	Class Room Assignment
Unit-I	Take Home Assignment		Take Home Assignment
Unit-I	Presentation	C-7	Presentation
Unit-II	Introducing DHTML		
Unit-II	Introducing DHTML	C-8	Lecture
Unit-II	Introducing JavaScript	C-9	Lecture
Unit-II	Client Side benefits of using JavaScript	C-10	Lecture
Unit-II	Class Room Assignment	C-11	Class Room Assignment
Unit-II	Embedding JavaScript in an HTML page	C-12	Lecture
Unit-II	Using Variables	C-13	Lecture
Unit-II	Using Operators, Working with Control Flow statements	C-14	Lecture
Unit-II	Using Operators, Working with Control Flow statements	C-15	Lecture
Unit-II	Working with functions	C-16	Lecture
Unit-II	Working with functions	C-17	Lecture
Unit-II	Handling Events	C-18	Lecture
Unit-II	Class Room Assignment	C-19	Class Room Assignment
Unit-II	Using Arrays	C-20	Lecture
Unit-II	Creating objects in JavaScript	C-21	Lecture
Unit-II	Creating objects in JavaScript	C-22	Lecture
Unit-II	Clarification Class	C-23	Clarification Class
Unit-II	Presentation	C-24	Presentation
Unit-II	Take Home Assignment		Take Home Assignment
Unit-III	Introduction to XML		
Unit-III	Introduction to XML, XML Basics, Advanced XML	C-25	Lecture
Unit-III	XML Technologies(DTD),Extensible Style Sheet Transformation (XSLT)	C-26	Lecture

Unit-III	XML Technologies(DTD),Extensible Style Sheet Transformation (XSLT)	C-27	Lecture
Unit-III	Introducing Java Beans	C-28	Lecture
Unit-III	Introducing Java Beans	C-29	Lecture
Unit-III	Introspection Design Patterns for properties	C-30	Lecture
Unit-III	Methods, Events	C-31	Lecture
Unit-III	Methods, Events	C-32	Lecture
Unit-III	Clarification Class	C-33	Clarification Class
Unit-III	Presentation	C-34	Presentation
Unit-III	Take Home Assignment		Take Home Assignment
Unit-III	Class Room Assignment	C-35	Class Room Assignment
Unit-IV	JDBC Architecture, JDBC Drivers, Communicating with Database using JDBC APIs, Creating a Simple Application , Describing Basic JDBC Statement		
Unit-IV	Creating tables by using JDBC, Working with Prepared Statement. Introducing the MVC architecture, Describing Servlets, Understanding Servlets, Understanding Servlets, Introducing the Servlet API, Servlet Life Cycle, Developing First Servlet Application , Generic Servlet Class	C-36	Lecture
Unit-V	Understanding Request Processing and HTTP Describing the ServletRequest Interface, Working with Initialization Parameters	C-37	Lecture
Unit-V	Introduction to JSP, Understanding JSP, Describing the JSP Life Cycle, Creating a Simple JSP pages, Working with JSP basic tags and Implicit objects, Working with Java Beans and Action tags in JSP.	C-38	Lecture
Unit-V	Clarification Class	C-39	Clarification Class
Unit-V	Presentation	C-40	Presentation
Unit-V	Take Home Assignment		Take Home Assignment
	Webinar	C-41	Webinar
	Seminar	C-42	Seminar
	Activity	C-43	Activity
	Activity	C-44	Activity
	Guest Lecture	C-45	Guest Lecture

CSEE14008–Advanced Lab

S. No.	Particulars	Class No.	Pedagogy of Class
1	A) Write a Java Program to create an applet that show a simple message along with background and foreground colors? B) Write a Java Program to create an applet that scrolls a message from left to right?	P-1,2	Practical
2	A) Write a Java Program to create an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked. B) Write a Java Program to create an applet that receives a string and returns either it Uppercase or Lowercase, reverse of given string, and length of a given String.	P-3,4	Practical
3	A) Write a Java Program to create an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked. B) Write a Java Program to create an applet that receives a string and returns either it Uppercase or Lowercase, reverse of given string, and length of a given String.	P-5,6	Practical
4	A) Write a Java Program to create an applet that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "Compute" is clicked. B) Write a Java Program to create an applet that receives a string and returns either it Uppercase or Lowercase, reverse of given string, and length of a given String.	P-7,8	Practical
5	A) Write a java program to draw Lines, ovals, filled ovals and arcs, filled arcs? B) Write a java program to draw rectangle, filled rectangle and rounded rectangle and filled rounded rectangle with any two colors? C) Write a java program to draw a smiley face?	P-9,10	Practical
6	A) Write a java program to draw Lines, ovals, filled	P-11,12	Practical

	ovals and arcs, filled arcs? B) Write a java program to draw rectangle, filled rectangle and rounded rectangle and filled rounded rectangle with any two colors? C) Write a java program to draw a smiley face?		
7	A) Write a Java program to demonstrate the mouse event handlers. B) Write a Java program to demonstrate the key event handlers.	P-13,14	Practical
8	A) Write a Java program to demonstrate the mouse event handlers. B) Write a Java program to demonstrate the key event handlers.	P-15,16	Practical
9	A) Write a Java program to demonstrate the mouse event handlers. B) Write a Java program to demonstrate the key event handlers.	P-17,18	Practical
10	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	P-19,20	Practical
11	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	P-21,22	Practical
12	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the	P-23,24	Practical

	program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.		
13	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	P25,26	Practical
14	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	P-27,28	Practical
15	Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.	P-29,30	Practical

CSEE14015– Cloud Computing

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Overview of Existing Hosting Platforms	C-1	Lecture
Unit-I	Grid Computing	C-2	Lecture
Unit-I	Utility Computing, Autonomic Computing	C-3	Lecture
Unit-I	Dynamic Datacenter Alliance	C-4	Lecture
Unit-I	Hosting / Outsourcing	C-5	Lecture
Unit-I	Introduction to Cloud Computing	C-6	Lecture
Unit-I	Workload Patterns for the Cloud	C-7	Lecture
Unit-I	Big Data	C-8	Lecture
Unit-I	IT as a Service	C-9	Lecture
Unit-I	Technology Behind Cloud Computing	C-10	Lecture
Unit-I	Clarification Class-1	C-11	Clarification Class
	Take Home Assignment-1		Take Home Assignments
	Class Room Assignment-1	C-12	Class Room Assignment
Unit-II	Amazon Web Services	C-13	Lecture
Unit-II	IaaS	C-14	Lecture
Unit-II	The Elastic Compute Cloud (EC2)	C-15	Lecture
Unit-II	The Simple Storage Service (S3)	C-16	Lecture
Unit-II	The Simple Queuing Services (SQS)	C-17	Lecture
Unit-II	VMware vCloud - IaaS	C-18	Lecture
Unit-II	vCloud Express	C-19	Lecture
Unit-II	Google AppEngine - PaaS	C-20	Lecture
Unit-II	The Java Runtime Environment	C-21	Lecture
Unit-II	Clarification Class-2	C-22	Clarification Class
	Take Home Assignment-2		Take Home Assignments
	Class Room Assignment-2	C-23	Class Room Assignment
	Presentation-1 & 2	C-24	Presentation
	Guest Lecture	C-25,26	Guest lecture
	Quiz-1 /Workshop	C-27	Quiz
Unit-III	The Datastore	C-28	Lecture
Unit-III	Development Workflow	C-29	Lecture
Unit-III	Windows Azure Platform	C-30	Lecture
Unit-III	Windows Azure Platform	C-31	Lecture
Unit-III	PaaS	C-32	Lecture
Unit-III	Windows Azure	C-33	Lecture
Unit-III	SQL Azure	C-34	Lecture
Unit-III	SQL Azure	C-35	Lecture
Unit-III	Windows AzureAppFabric	C-36	Lecture
Unit-III	Windows AzureAppFabric	C-37	Lecture
Unit-III	Clarification Class-3	C-38	Clarification Class
Unit-III	Take Home Assignment-3		Take Home Assignments
	Class Room Assignment-3	C-39	Class Room

			Assignment
	Presentation-3 & 4	C-40	Presentation
	Webinar	C-41,42	Webinar
	Activity-1 Mind Mapping	C-43	Activity
Unit-IV	SaaS / PaaS	C-44	Lecture
Unit-IV	Force.com	C-45	Lecture
Unit-IV	Force Database	C-46	Lecture
Unit-IV	Data Security	C-47	Lecture
Unit-IV	Class Room Assignment-4	C-48	Class Room Assignment
Unit-IV	The persistency layer	C-49	Lecture
Unit-IV	Microsoft Office Live - SaaS	C-50	Lecture
Unit-IV	LiveMesh.com	C-51	Lecture
Unit-IV	LiveMesh.com	C-52	Lecture
Unit-IV	Google Apps - SaaS	C-53	Lecture
Unit-IV	Google Apps - SaaS	C-54	Lecture
Unit-IV	A Comparison of Cloud Computing Platforms	C-55	Lecture
Unit-IV	Common Building Blocks	C-56	Lecture
Unit-IV	Common Building Blocks	C-57	Lecture
Unit-IV	Case studies on latest paradigms	C-58	Lecture
Unit-IV	Case studies on latest paradigms	C-59	Lecture
	Clarification Class-4	C-60	Clarification Class

CSEE14017– Software Verification and Validation

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction		
Unit-I	Terminology, error	C-1	Lecture
Unit-I	Fault and failures	C-2	Lecture
Unit-I	Design for testability, objectives	C-3	Lecture
Unit-I	Purpose of testing	C-4	Lecture
Unit-I	Testing technology	C-5	Lecture
Unit-I	Error, terminology	C-6	Lecture
Unit-I	Type of Debugging	C-7	Lecture
Unit-I	Design principles	C-8	Lecture
Unit-I	Clarification class 1	C-9	Clarification Class
Unit-I	Presentation 1	C-10	Presentation
Unit-I	Class room assignment 1	C-11	Class Assignment
	Guest lecture	C-12	Guest lecture
Unit-II	Limitations, Role of V&V in Software Evolution, Testing Techniques and Strategies		
Unit-II	Theoretical foundations: impracticality of testing all data	C-13	Lecture
Unit-II	Types of Products: requirements, specifications, designs, implementations, changes	C-14	Lecture
Unit-II	V&V objectives: correctness, consistency, necessity, sufficiency, performance	C-15	Lecture
Unit-II	Static and dynamic testing, software technical reviews	C-16	Lecture
Unit-II	Software testing: levels of testing - module, integration	C-17	Lecture
Unit-II	System, regression, Testing techniques	C-18	Lecture
Unit-II	Structural testing and analysis, error-oriented testing and analysis	C-19	Lecture
Unit-II	Integration strategies, transaction flow analysis, stress analysis, failure analysis	C-20	Lecture
Unit-II	Applicability-functional testing and analysis	C-21	Lecture
Unit-II	Impracticality of testing all paths, no absolute proof of correctness	C-22	Lecture
Unit-II	Hybrid approaches	C-23	Lecture
Unit-II	Concurrency analysis, performance analysis	C-24	Lecture
Unit-II	Presentation 2	C-25	Presentation
Unit-II	Clarification class 2	C-26	Clarification Class
Unit-II	Classroom assignment 2	C-27	Class Assignment
	Webinar 1	C-28	Webinar
	Take home assignment 1		Home Assignments
Unit-III	Flow graphs and Path Testing, Transaction Flow Testing, Data Flow Testing		
Unit-III	Flow graphs and Path Testing	C-29	Lecture
Unit-III	Path testing basics, path predicates	C-30	Lecture
Unit-III	Transaction flow testing	C-31	Lecture

Unit-III	Generalizations, transaction flows, data flow testing	C-32	Lecture
Unit-III	Activity-1	C-33	Lecture
Unit-III	Basics of Data flow model	C-34	Lecture
Unit-III	Data flow testing strategies, Applications	C-35	Lecture
Unit-III	Transaction flow testing, data flow testing	C-36	Lecture
Unit-III	Application of Path Testing	C-37	Lecture
Unit-III	Transaction-Flow testing techniques	C-38	Lecture
Unit-III	Applications of Data flow testing strategies	C-39	Lecture
Unit-III	Presentation 3	C-40	Presentation
	Clarification class 3	C-41	Clarification Class
	Classroom assignment 3	C-42	Class Assignment
	Workshop 1	C-43	Workshop
	Take home assignment 2		Home Assignments
	Quiz 1	C-44	Quiz
Unit-IV	Software Testing and Regular Expression, Program Mutation Testing, Laboratory Work		Lecture
Unit-IV	Software Testing and Regular Expression: Path products, path sums, Loops, Reduction procedure, Applications	C-45	Lecture
Unit-IV	Approximate number of paths, The mean processing time of any routine	C-46	Lecture
Unit-IV	Regular expression and Flow-anomaly detection	C-47	Lecture
Unit-IV	Presentation 4	C-48	Presentation
Unit-IV	Class room assignment 4	C-49	Class Assignment
Unit-IV	Take home assignments 3		Home Assignments
Unit-IV	Program Mutation Testing: Introduction, Mutation and mutants, Mutation operators, Equivalent mutants	C-50	Lecture
Unit-IV	Laboratory Work: Developing various exercises like cyclomatic complexity	C-51	Lecture
Unit-IV	Fault detection using mutants, Types of mutants	C-52	Lecture
Unit-IV	Activity-2	C-53	Activity
Unit-IV	Mutation operators for C and Java.	C-54	Lecture
Unit-IV	Boundary value analysis and data flow testing etc.	C-55	Lecture
Unit-IV	Developing a small project/tool to generate test data	C-56	Lecture
Unit-IV	Execute test data etc. Exposure to automated testing tool	C-57	Lecture
Unit-IV	Clarification class 4	C-58	Clarification Class
	Webinar 2	C-59	Webinar
	Seminar	C-60	Seminar

SEC077006– Ability and Skill Enhancement -VI

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Logical Sequence of Words	C-1	Lecture
Unit-I	Verbal Analogy	C-2	Lecture
Unit-I	Classification	C-3	Activity
Unit-I	Blood Relation Test	C-4	Activity
Unit-I	Syllogism	C-5	Activity
Unit-I	Reading Comprehension	C-6	Class Assignment
Unit-II	How to develop a winning attitude	C-7	Lecture
Unit-II	How to have a winning and positive mindset, how to win in difficult situations	C-8	Presentation
Unit-II	How to have a winning and positive mindset, how to win in difficult situations	C-9	Presentation
Unit-II	Positing thinking, passion dedication confidence, well preparation, focus, hard work, planning, never give up, etc-some trails that help in developing	C-10	Lecture
Unit -III	Reading Current News - Assignment	C-11	Presentation
Unit -III	Comparing & Analysing the news	C-12	Presentation
Unit -III	Write an editorial	C-13	Activity
Unit -III	Clarification Class I	C-14	Clarification Class
Unit -III	News Vocabulary	C-15	Activity
Unit -III	News Vocabulary		Home Assignments
Unit -III	Presentation on any major news (political/ social/sports/economics)	C-16	Presentation
Unit -III	Presentation on any major news (political/ social/sports/economics)	C-17	Presentation
Unit -IV	Chat Show	C-18	Activity
Unit -IV	Panel Discussion	C-19	Group discussions
Unit -IV	Panel Discussion -	C-20	Group discussions
Unit -IV	Parliamentary debate	C-21	Activity
Unit -IV	News Inspired Theatrical Performance	C-22	Activity
Unit -IV	Clarification Class II	C-23	Clarification Class
Unit-V	Preparing a report on major National/International News	C-24	Lecture
Unit-V	Insights/ review of major news papers and news channels	C-25	Lecture
Unit-V	Take Home Assignment		Home Assignments
Unit-V	Clarification Class III	C26	Clarification Class
Unit-V	Preparing a report on major National/International News	C-27	Activity
Unit-V	Insights/ review of major news papers and news channels	C-28	Lecture
Unit-V	Insights/ review of major news papers and news channels	C-29	Activity
	Clarification Class IV	C-30	Clarification Class

CSEE14005-Database Administration with Oracle

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Oracle Database Administration	C-1	Lecture
Unit-I	Overview of Oracle Database, Understanding Oracle Database Architecture	C-2	Lecture
Unit-I	Oracle Database Components: SGA, PGA, and Background Processes	C-3	Lecture
Unit-I	Oracle Database Installation and Configuration	C-4	Lecture
Unit-I	Tools for DBA: SQL*Plus, RMAN, and Oracle Enterprise Manager	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-II	Database Storage and Management	C-7	Lecture
Unit-II	Database Storage and Management	C-8	Lecture
Unit-II	Presentation	C-9	Presentation
Unit-II	Managing Tablespaces and Datafiles	C-10	Lecture
Unit-II	Managing Tablespaces and Datafiles	C-11	Lecture
Unit-II	Segments, Extents, and Blocks	C-12	Lecture
Unit-II	Segments, Extents, and Blocks	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Managing Undo Tablespaces	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Oracle ASM (Automatic Storage Management)	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Tablespace and Undo Management	C-18	Lecture
Unit -II	ASM and Storage Management	C-19	Lecture
Unit -III	Backup and Recovery Strategies	C-20	Lecture
Unit -III	Backup Types: Full, Incremental, and Cumulative	C-21	Lecture
Unit -III	Configuring and Using RMAN (Recovery Manager)	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Performing Database Recovery	C-24	Lecture
Unit -III	Flashback Technologies: Flashback Table, Query, and Database	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Backup and Recovery Best Practices	C-27	Lecture
Unit -III	Backup and Recovery Best Practices	C-28	Lecture
Unit -III	Backup and Recovery Best Practices	C-29	Lecture
Unit -III	Classroom Assignment	C-30	Lecture
Unit-IV	Performance Tuning and Optimization	C-31	Lecture
Unit-IV	Understanding Database Performance Issues	C-32	Lecture
Unit-IV	Understanding Database Performance Issues	C-33	Lecture
Unit-IV	Oracle Performance Tuning Tools: AWR, ADDM, and TKPROF	C-34	Lecture
Unit-IV	Oracle Performance Tuning Tools: AWR, ADDM, and TKPROF	C-35	Lecture

Unit-IV	Query and Index Optimization	C-36	Lecture
Unit-IV	Query and Index Optimization	C-37	Lecture
Unit-IV	Managing Database Resources with Resource Manager	C-38	Lecture
Unit-IV	Managing Database Resources with Resource Manager	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Performance Tuning	C-42	Lecture
Unit-IV	Database Performance Optimization	C-43	Lecture
Unit-V	User Management and Security User Management and Security	C-44	Lecture
Unit-V	Creating and Managing Users	C-45	Lecture
Unit-V	Creating and Managing Users	C-46	Lecture
Unit-V	Assigning Roles and Privileges	C-47	Lecture
Unit-V	Assigning Roles and Privileges	C-48	Lecture
Unit-V	Auditing and Security Policies	C-49	Lecture
Unit-V	Auditing and Security Policies	C-50	Lecture
Unit-V	Database Encryption Techniques	C-51	Lecture
Unit-V	Database Encryption Techniques	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Security in Oracle Databases	C-55	Lecture
Unit-V	Security in Oracle Databases	C-56	Lecture
Unit-V	Security in Oracle Databases	C-57	Lecture
Unit-V	Security in Oracle Databases	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14006- Database Administration with IBM DB2

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Overview of IBM DB2, Features, and Editions	C-1	Lecture
Unit-I	IBM DB2 Database Architecture	C-2	Lecture
Unit-I	Installation and Configuration of IBM DB2	C-3	Lecture
Unit-I	DB2 Tools: Command Line Processor (CLP), IBM Data Studio	C-4	Lecture
Unit-I	DB2 Tools: Command Line Processor (CLP), IBM Data Studio	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	IBM DB2 Setup	C-7	Lecture
Unit-II	IBM DB2 Architecture	C-8	Lecture
Unit-II	Presentation	C-9	Presentation
Unit-II	Tablespaces, Buffer Pools, Containers	C-10	Lecture
Unit-II	Tablespaces, Buffer Pools, Containers	C-11	Lecture
Unit-II	Tables, Views, Indexes in DB2	C-12	Lecture
Unit-II	Partitioning and Clustering in DB2	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Storage Structures and Optimization	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Storage Structures and Optimization	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -III	DB2 Backup Strategies	C-19	Lecture
Unit -III	DB2 Backup Strategies	C-20	Lecture
Unit -III	Recovery and Rollforward Operations	C-21	Lecture
Unit -III	Recovery and Rollforward Operations	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Performing Database Recovery	C-24	Lecture
Unit -III	High Availability and Disaster Recovery	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Using DB2 HADR	C-27	Lecture
Unit -III	Using DB2 HADR	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Query Optimization Techniques	C-31	Lecture
Unit-IV	Query Optimization Techniques	C-32	Lecture
Unit-IV	Indexing Strategies & Performance Monitoring	C-33	Lecture
Unit-IV	Indexing Strategies & Performance Monitoring	C-34	Lecture
Unit-IV	Explain and Visual Explain Tools	C-35	Lecture

Unit-IV	Explain and Visual Explain Tools	C-36	Lecture
Unit-IV	DB2 Workload Manager	C-37	Lecture
Unit-IV	DB2 Workload Manager	C-38	Lecture
Unit-IV	DB2 Workload Manager	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	User Management, Roles & Permissions	C-43	Lecture
Unit-V	User Management, Roles & Permissions	C-44	Lecture
Unit-V	Security Policies & Encryption	C-45	Lecture
Unit-V	Security Policies & Encryption	C-46	Lecture
Unit-V	Auditing in DB2: Monitoring	C-47	Lecture
Unit-V	Auditing in DB2: Monitoring	C-48	Lecture
Unit-V	Authentication & Authorization	C-49	Lecture
Unit-V	Authentication & Authorization	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Discussion/Clarification	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Presentations	C-55	Presentations
Unit-V	Auditing in DB2: Compliance	C-56	Lecture
Unit-V	Auditing in DB2: Compliance	C-57	Lecture
Unit-V	Auditing in DB2: Compliance	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14009- Data warehouse and Data Mining

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Data Warehousing	C-1	Lecture
Unit-I	Definition and Characteristics of Data Warehouses	C-2	Lecture
Unit-I	OLAP vs OLTP	C-3	Lecture
Unit-I	OLAP vs OLTP	C-4	Lecture
Unit-I	Data Warehouse Architecture (Basic, Business, Virtual)	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Data Warehouse Architecture (Basic, Business, Virtual)	C-7	Lecture
Unit-I	Data Marts, Metadata, ETL (Extract, Transform, Load) Process	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Schema Design: Star, Snowflake, and Fact Constellation	C-10	Lecture
Unit-II	OLAP Operations: Roll-up, Drill-down, Slice, Dice, Pivot	C-11	Lecture
Unit-II	OLAP Operations: Roll-up, Drill-down, Slice, Dice, Pivot	C-12	Lecture
Unit-II	Data Preprocessing: Cleaning, Integration, Transformation, Reduction	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Data Preprocessing: Cleaning, Integration, Transformation, Reduction	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Data Preprocessing: Cleaning, Integration, Transformation, Reduction	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Data Discretization and Concept Hierarchy Generation	C-19	Lecture
Unit -III	Introduction to Data Mining: Definition, Applications, and Challenges of Data Mining	C-20	Lecture
Unit -III	Association Rule Mining: Apriori and FP-Growth Algorithms	C-21	Lecture
Unit -III	Classification Techniques: Decision Trees, Naïve Bayes, k-NN	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Classification Techniques: Decision Trees, Naïve Bayes, k-NN	C-24	Lecture
Unit -III	Classification Techniques: Decision Trees, Naïve Bayes, k-NN	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Clustering Methods: K-Means	C-27	Lecture
Unit -III	Clustering Methods: Hierarchical Clustering, DBSCAN	C-28	Lecture

Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Neural Networks	C-31	Lecture
Unit-IV	Deep Learning in Data Mining	C-32	Lecture
Unit-IV	Support Vector Machines	C-33	Lecture
Unit-IV	Random Forests	C-34	Lecture
Unit-IV	Mining Streaming	C-35	Lecture
Unit-IV	Spatial, and Multimedia Data	C-36	Lecture
Unit-IV	Spatial, and Multimedia Data	C-37	Lecture
Unit-IV	Text and Web Mining	C-38	Lecture
Unit-IV	Text and Web Mining	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	Applications and Trends in Data Mining	C-43	Lecture
Unit-V	Applications and Trends in Data Mining	C-44	Lecture
Unit-V	Business Intelligence	C-45	Lecture
Unit-V	Business Intelligence	C-46	Lecture
Unit-V	Data Analytics	C-47	Lecture
Unit-V	Data Analytics	C-48	Lecture
Unit-V	Ethical and Privacy Issues in Data Mining	C-49	Lecture
Unit-V	Ethical and Privacy Issues in Data Mining	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Big Data Analytic	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Machine Learning Integration	C-55	Lecture
Unit-V	Case Studies in Data Warehousing and Mining	C-56	Lecture
Unit-V	Case Studies in Data Warehousing and Mining	C-57	Lecture
Unit-V	Case Studies in Data Warehousing and Mining	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14010- Network Programming

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to OSI and TCP/IP Models	C-1	Lecture
Unit-I	Basics of Sockets and Ports	C-2	Lecture
Unit-I	Client-Server Communication Model	C-3	Lecture
Unit-I	IPv4 vs IPv6 Addressing	C-4	Lecture
Unit-I	IPv4 vs IPv6 Addressing	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	TCP vs UDP Communication	C-7	Lecture
Unit-I	TCP vs UDP Communication	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Packet Structure Analysis	C-10	Lecture
Unit-II	Creating and Binding Sockets	C-11	Lecture
Unit-II	TCP Socket Programming	C-12	Lecture
Unit-II	UDP Socket Programming	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Socket Options and Error Handling	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Implementing TCP Client-Server	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Implementing TCP Client-Server	C-19	Lecture
Unit -III	Non-Blocking I/O and Multiplexing	C-20	Lecture
Unit -III	Remote Procedure Calls (RPC)	C-21	Lecture
Unit -III	HTTP and RESTful API Communication	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Secure Socket Layer (SSL/TLS)	C-24	Lecture
Unit -III	Cybersecurity in Networking	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Cybersecurity in Networking	C-27	Lecture
Unit -III	Cybersecurity in Networking	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Network Performance Optimization	C-31	Lecture
Unit-IV	Network Performance Optimization	C-32	Lecture
Unit-IV	Measuring Latency and Bandwidth	C-33	Lecture
Unit-IV	Measuring Latency and Bandwidth	C-34	Lecture
Unit-IV	Encryption and Authentication Techniques	C-35	Lecture
Unit-IV	Encryption and Authentication Techniques	C-36	Lecture
Unit-IV	Firewalls, VPNs, and Secure Communication	C-37	Lecture
Unit-IV	Implementing a Secure Chat Application	C-38	Lecture
Unit-IV	Implementing a Secure Chat Application	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	Cloud Networking and SDN	C-43	Lecture
Unit-V	Network Automation with Python	C-44	Lecture
Unit-V	IoT Networking and Wireless Protocols	C-45	Lecture

Unit-V	IoT Networking	C-46	Lecture
Unit-V	IoT Networking	C-47	Lecture
Unit-V	IoT Networking	C-48	Lecture
Unit-V	IoT Networking	C-49	Lecture
Unit-V	Wireless Protocols	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Wireless Protocols	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Trends in Network Programming	C-55	Lecture
Unit-V	Future Trends in Network Programming	C-56	Lecture
Unit-V	Network Automation Tools	C-57	Lecture
Unit-V	Network Automation Tools	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14011- Advanced Data Structures

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Review of Basic Data Structures	C-1	Lecture
Unit-I	Review of Basic Data Structures	C-2	Lecture
Unit-I	Review of Basic Data Structures	C-3	Lecture
Unit-I	Amortized Analysis and Complexity	C-4	Lecture
Unit-I	Amortized Analysis and Complexity	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Persistent Data Structures	C-7	Lecture
Unit-I	Persistent Data Structures	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Skip Lists	C-10	Lecture
Unit-II	AVL Trees: Rotations and Operations	C-11	Lecture
Unit-II	AVL Tree Implementation	C-12	Lecture
Unit-II	Red-Black Trees: Insert/Delete	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Red-Black Trees: Insert/Delete	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	B-Trees and B+ Trees	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Tries and Suffix Trees	C-19	Lecture
Unit -III	Binary Heaps	C-20	Lecture
Unit -III	Fibonacci Heaps	C-21	Lecture
Unit -III	Fibonacci Heaps	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Hashing Techniques: Open Addressing & Chaining	C-24	Lecture
Unit -III	Bloom Filters	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Modern Hashing Applications	C-27	Lecture
Unit -III	Modern Hashing Applications	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Graph Representation	C-31	Lecture
Unit-IV	Graph Representation	C-32	Lecture
Unit-IV	DFS and BFS	C-33	Lecture
Unit-IV	Shortest Path Algorithms	C-34	Lecture
Unit-IV	Shortest Path Algorithms	C-35	Lecture
Unit-IV	Minimum Spanning Trees	C-36	Lecture
Unit-IV	Graph Algorithms Implementation	C-37	Lecture
Unit-IV	Graph Algorithms Implementation	C-38	Lecture
Unit-IV	Graph-Based Machine Learning	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	Dynamic Graph Algorithms	C-43	Lecture

Unit-V	Dynamic Graph Algorithms	C-44	Lecture
Unit-V	Persistent and External Data Structures	C-45	Lecture
Unit-V	Persistent and External Data Structures	C-46	Lecture
Unit-V	String Matching Algorithms	C-47	Lecture
Unit-V	String Matching Algorithms	C-48	Lecture
Unit-V	Advanced Cache-Efficient Data Structures	C-49	Lecture
Unit-V	Real-World Applications of Data Structures	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Real-World Applications of Data Structures	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Discussion/Clarification	C-55	Lecture
Unit-V	Discussion/Clarification	C-56	Lecture
Unit-V	Interactive Discussion	C-57	Lecture
Unit-V	Interactive Discussion	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14012- Advanced Database Management System

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Review of RDBMS	C-1	Lecture
Unit-I	Object-Oriented and Object-Relational Databases	C-2	Lecture
Unit-I	Object-Oriented and Object-Relational Databases	C-3	Lecture
Unit-I	XML and JSON Databases	C-4	Lecture
Unit-I	XML and JSON Databases	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Introduction to Graph Databases	C-7	Lecture
Unit-I	XML and JSON in Databases	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	NoSQL vs NewSQL	C-10	Lecture
Unit-II	Query Parsing and Execution Plans	C-11	Lecture
Unit-II	Query Parsing and Execution Plans	C-12	Lecture
Unit-II	Indexing and Hashing Techniques	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Cost-Based Query Optimization	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Materialized Views and Query Caching	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Query Optimization Exercises	C-19	Lecture
Unit -III	ACID Properties and Serializability	C-20	Lecture
Unit -III	Concurrency Control: Locking and Timestamping	C-21	Lecture
Unit -III	Deadlock Detection and Prevention	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Distributed Transactions and Two-Phase Commit	C-24	Lecture
Unit -III	Distributed Transactions and Two-Phase Commit	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Distributed Database Management	C-27	Lecture
Unit -III	Distributed Database Management	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Distributed Database Architecture	C-31	Lecture
Unit-IV	Distributed Database Architecture	C-32	Lecture
Unit-IV	CAP Theorem and BASE Properties	C-33	Lecture
Unit-IV	NoSQL Databases: Key-Value, Document, Column-Family, Graph	C-34	Lecture
Unit-IV	NoSQL Databases: Key-Value, Document, Column-Family, Graph	C-35	Lecture
Unit-IV	Data Replication and Sharding Strategies	C-36	Lecture
Unit-IV	Data Replication and Sharding Strategies	C-37	Lecture
Unit-IV	NoSQL Queries in MongoDB	C-38	Lecture
Unit-IV	NoSQL Queries in MongoDB	C-39	Lecture

Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	Authentication and Access Control	C-43	Lecture
Unit-V	Authentication and Access Control	C-44	Lecture
Unit-V	SQL Injection and Prevention	C-45	Lecture
Unit-V	SQL Injection and Prevention	C-46	Lecture
Unit-V	Backup and Recovery Techniques	C-47	Lecture
Unit-V	Backup and Recovery Techniques	C-48	Lecture
Unit-V	Blockchain for Database Security	C-49	Lecture
Unit-V	Database Security Challenges	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Database Security Challenges	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Database Security Challenges	C-55	Lecture
Unit-V	Discussion/Clarification	C-56	Lecture
Unit-V	Interactive Discussion	C-57	Lecture
Unit-V	Interactive Discussion	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14013- Linux Administration and Shell Programming

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Linux Architecture and Kernel Basics	C-1	Lecture
Unit-I	Linux File System and Directory Structure	C-2	Lecture
Unit-I	Linux File System and Directory Structure	C-3	Lecture
Unit-I	Basic Linux Commands and File Manipulation	C-4	Lecture
Unit-I	Basic Linux Commands and File Manipulation	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	User and Group Management	C-7	Lecture
Unit-I	User and Group Management	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Linux File System Navigation	C-10	Lecture
Unit-II	Boot Process and System Initialization	C-11	Lecture
Unit-II	Package Management (RPM, YUM, APT)	C-12	Lecture
Unit-II	Package Management (RPM, YUM, APT)	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Disk Partitioning and File System Management	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	System Performance Monitoring and Logging	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	File System Permissions	C-19	Lecture
Unit -III	Introduction to Shell Scripting	C-20	Lecture
Unit -III	Variables, Operators, and Control Structures	C-21	Lecture
Unit -III	Variables, Operators, and Control Structures	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Functions and Looping Constructs	C-24	Lecture
Unit -III	Functions and Looping Constructs	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	File Handling and String Processing	C-27	Lecture
Unit -III	File Handling and String Processing	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Network Configuration and Troubleshooting	C-31	Lecture
Unit-IV	Firewall and IPTables	C-32	Lecture
Unit-IV	Firewall and IPTables	C-33	Lecture
Unit-IV	Secure Shell (SSH) and File Transfer (SCP, SFTP)	C-34	Lecture
Unit-IV	Secure Shell (SSH) and File Transfer (SCP, SFTP)	C-35	Lecture
Unit-IV	User Permissions and Access Control Lists	C-36	Lecture
Unit-IV	User Permissions and Access Control Lists	C-37	Lecture
Unit-IV	Linux Network Configuration	C-38	Lecture
Unit-IV	Linux Network Configuration	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	Automating System Administration Tasks	C-43	Lecture

Unit-V	Automating System Administration Tasks	C-44	Lecture
Unit-V	Performance Tuning and Optimization	C-45	Lecture
Unit-V	Performance Tuning and Optimization	C-46	Lecture
Unit-V	Debugging and System Recovery	C-47	Lecture
Unit-V	Debugging and System Recovery	C-48	Lecture
Unit-V	Virtualization and Containerization	C-49	Lecture
Unit-V	Virtualization and Containerization	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Real-World Linux Deployment	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Real-World Linux Deployment	C-55	Lecture
Unit-V	Real-World Linux Deployment	C-56	Lecture
Unit-V	Interactive Discussion	C-57	Lecture
Unit-V	Interactive Discussion	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14014- Wireless Networks

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Wireless Communication	C-1	Lecture
Unit-I	Wireless Propagation Models	C-2	Lecture
Unit-I	Wireless Propagation Models	C-3	Lecture
Unit-I	Modulation Techniques: FDMA, TDMA, CDMA, OFDMA	C-4	Lecture
Unit-I	Modulation Techniques: FDMA, TDMA, CDMA, OFDMA	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Cellular Concept and Frequency Reuse	C-7	Lecture
Unit-I	Wireless Standards (IEEE 802.11, LTE, etc.)	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Frequency Reuse Calculation	C-10	Lecture
Unit-II	Infrastructure vs. Ad-Hoc Wireless Networks	C-11	Lecture
Unit-II	MAC Layer Protocols for Wireless Networks	C-12	Lecture
Unit-II	Routing Protocols in Wireless Networks	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	TCP over Wireless Networks	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	TCP over Wireless Networks	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Routing Simulation	C-19	Lecture
Unit -III	Security Issues in Wireless Networks	C-20	Lecture
Unit -III	Authentication Mechanisms in Wi-Fi Networks	C-21	Lecture
Unit -III	Wireless Encryption Standards (WEP, WPA, WPA2, WPA3)	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Attacks on Wireless Networks	C-24	Lecture
Unit -III	Attacks on Wireless Networks	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Cybersecurity in Wireless Networks	C-27	Lecture
Unit -III	Cybersecurity in Wireless Networks	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Wi-Fi Network Deployment and Optimization	C-31	Lecture
Unit-IV	Wi-Fi Network Deployment and Optimization	C-32	Lecture
Unit-IV	Performance Metrics and QoS in Wireless Networks	C-33	Lecture
Unit-IV	Performance Metrics and QoS in Wireless Networks	C-34	Lecture
Unit-IV	Interference and Channel Allocation Strategies	C-35	Lecture
Unit-IV	Interference and Channel Allocation Strategies	C-36	Lecture
Unit-IV	Mobility Management in Wireless Networks	C-37	Lecture
Unit-IV	Wireless Network Planning	C-38	Lecture
Unit-IV	Tools for Wireless Network Monitoring	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom

			Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	IoT and Wireless Sensor Networks	C-43	Lecture
Unit-V	IoT and Wireless Sensor Networks	C-44	Lecture
Unit-V	5G Networks and Beyond	C-45	Lecture
Unit-V	Cognitive Radio and Dynamic Spectrum Access	C-46	Lecture
Unit-V	Cognitive Radio and Dynamic Spectrum Access	C-47	Lecture
Unit-V	Wireless Mesh Networks and Smart Cities	C-48	Lecture
Unit-V	Wireless Mesh Networks and Smart Cities	C-49	Lecture
Unit-V	Future Challenges in Wireless Communication	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Future Challenges in Wireless Communication	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Challenges in Wireless Communication	C-55	Lecture
Unit-V	Future Challenges in Wireless Communication	C-56	Lecture
Unit-V	Recap of All Units	C-57	Lecture
Unit-V	Recap of All Units	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14016-Software Reuse

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Software Reuse	C-1	Lecture
Unit-I	Levels of Software Reuse	C-2	Lecture
Unit-I	Challenges and Barriers in Software Reuse	C-3	Lecture
Unit-I	Software Reuse Economics and Cost Analysis	C-4	Lecture
Unit-I	Software Reuse Economics and Cost Analysis	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Identifying Reuse Opportunities	C-7	Lecture
Unit-I	Open-Source Software Reuse	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Open-Source Software Reuse	C-10	Lecture
Unit-II	Component-Based Software Development (CBSD)	C-11	Lecture
Unit-II	Object-Oriented Reuse and Inheritance	C-12	Lecture
Unit-II	Object-Oriented Reuse and Inheritance	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Design Patterns and Frameworks for Reuse	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Generative Programming and Domain Engineering	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Generative Programming and Domain Engineering	C-19	Lecture
Unit -III	Reuse in Requirements Engineering	C-20	Lecture
Unit -III	Reuse in Software Design and Architecture |	C-21	Lecture
Unit -III	Reuse in Coding and Implementation	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Reuse in Coding and Implementation	C-24	Lecture
Unit -III	Reuse in Testing and Maintenance	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Reuse in Testing and Maintenance	C-27	Lecture
Unit -III	Software Reuse in Large-Scale Projects	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Software Product Line Engineering	C-31	Lecture
Unit-IV	Feature-Oriented Software Development	C-32	Lecture
Unit-IV	Domain-Specific Languages (DSLs) for Reuse	C-33	Lecture
Unit-IV	Domain-Specific Languages (DSLs) for Reuse	C-34	Lecture
Unit-IV	Reuse Metrics and Quality Assurance	C-35	Lecture
Unit-IV	Reuse Metrics and Quality Assurance	C-36	Lecture
Unit-IV	Evaluating Software Reuse Metrics	C-37	Lecture
Unit-IV	Evaluating Software Reuse Metrics	C-38	Lecture
Unit-IV	Case Studies on Software Product Lines	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar

Unit-V	AI and Machine Learning in Software Reuse	C-43	Lecture
Unit-V	Cloud-Based Reusable Components and Services	C-44	Lecture
Unit-V	Cloud-Based Reusable Components and Services	C-45	Lecture
Unit-V	Software-as-a-Service (SaaS) and API Reuse	C-46	Lecture
Unit-V	Software-as-a-Service (SaaS) and API Reuse	C-47	Lecture
Unit-V	Software-as-a-Service (SaaS) and API Reuse	C-48	Lecture
Unit-V	Security and Legal Issues in Software Reuse	C-49	Lecture
Unit-V	Security and Legal Issues in Software Reuse	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Future Trends in Software Reuse	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Trends in Software Reuse	C-55	Lecture
Unit-V	Future Trends in Software Reuse	C-56	Lecture
Unit-V	Future Trends in Software Reuse	C-57	Lecture
Unit-V	Future Trends in Software Reuse	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14018-Software Design and Construction

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Software Engineering and SDLC	C-1	Lecture
Unit-I	Software Design Principles	C-2	Lecture
Unit-I	Design Thinking in Software Development	C-3	Lecture
Unit-I	Software Development Models	C-4	Lecture
Unit-I	Identify Design Principles in a Case Study	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Identify Design Principles in a Case Study	C-7	Lecture
Unit-I	Agile vs Waterfall Methodology	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Agile vs Waterfall Methodology	C-10	Lecture
Unit-II	Introduction to Software Architecture	C-11	Lecture
Unit-II	Architectural Styles (Layered, Client-Server, etc.)	C-12	Lecture
Unit-II	Object-Oriented Design Principles (SOLID)	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Design Patterns (Singleton, Factory, Observer, MVC)	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Design Patterns (Singleton, Factory, Observer, MVC)	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Implementing a Design Pattern	C-19	Lecture
Unit -III	Code Structuring and Documentation Standards	C-20	Lecture
Unit -III	Version Control Systems (Git, SVN)	C-21	Lecture
Unit -III	Debugging and Exception Handling	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Secure Coding Practices	C-24	Lecture
Unit -III	Secure Coding Practices	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Secure Coding and Threat Modeling	C-27	Lecture
Unit -III	Secure Coding and Threat Modeling	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Unit Testing and Test-Driven Development	C-31	Lecture
Unit-IV	Unit Testing and Test-Driven Development	C-32	Lecture
Unit-IV	Static and Dynamic Code Analysis	C-33	Lecture
Unit-IV	Static and Dynamic Code Analysis	C-34	Lecture
Unit-IV	Quality Metrics and Software Reliability	C-35	Lecture
Unit-IV	Software Testing Strategies (Unit, Integration, System)	C-36	Lecture
Unit-IV	Software Testing Strategies (Unit, Integration, System)	C-37	Lecture
Unit-IV	Software Testing Strategies (Unit, Integration,	C-38	Lecture

	System)		
Unit-IV	Writing Unit Tests for a Sample Codebase	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar: Role of Automation in Software Testing	C-42	Webinar
Unit-V	Software Maintenance and Evolution	C-43	Lecture
Unit-V	Refactoring for Performance and Maintainability	C-44	Lecture
Unit-V	Refactoring for Performance and Maintainability	C-45	Lecture
Unit-V	Reverse Engineering and Reengineering	C-46	Lecture
Unit-V	Reverse Engineering and Reengineering	C-47	Lecture
Unit-V	Software Metrics for Performance Evaluation	C-48	Lecture
Unit-V	Software Metrics for Performance Evaluation	C-49	Lecture
Unit-V	Software Metrics for Performance Evaluation	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Future Trends in Software Development	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Trends in Software Development	C-55	Lecture
Unit-V	Future Trends in Software Development	C-56	Lecture
Unit-V	Interactive Discussion	C-57	Lecture
Unit-V	Interactive Discussion	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14019-Software Quality Management

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Software Quality	C-1	Lecture
Unit-I	Software Quality Models (McCall, Boehm, Dromey)	C-2	Lecture
Unit-I	Software Quality Attributes and Metrics	C-3	Lecture
Unit-I	Cost of Software Quality (COQ)	C-4	Lecture
Unit-I	Quality Planning	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Risk Management in Software Quality	C-7	Lecture
Unit-I	Risk Management in Software Quality	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	Risk Management in Software Quality	C-10	Lecture
Unit-II	Software Quality Assurance Activities	C-11	Lecture
Unit-II	Software Quality Assurance Activities	C-12	Lecture
Unit-II	Role of Software Testing in Quality	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Testing Techniques (White-Box, Black-Box, Grey-Box)	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Defect Tracking and Management	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	Automated Testing Case Study	C-19	Lecture
Unit -III	Defect Management Strategies	C-20	Lecture
Unit -III	Defect Management Strategies	C-21	Lecture
Unit -III	Software Process Models (Waterfall, Agile, DevOps)	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Software Process Models (Waterfall, Agile, DevOps)	C-24	Lecture
Unit -III	Capability Maturity Model Integration (CMMI)	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	ISO 9001 for Software Quality	C-27	Lecture
Unit -III	Six Sigma in Software Quality	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Implementing CMMI in Real-World Projects	C-31	Lecture
Unit-IV	Software Quality Standards: IEEE, ISO, CMMI	C-32	Lecture
Unit-IV	Auditing and Compliance in Software Quality	C-33	Lecture
Unit-IV	Auditing and Compliance in Software Quality	C-34	Lecture
Unit-IV	Quality Management Tools and Techniques	C-35	Lecture
Unit-IV	Software Configuration Management	C-36	Lecture
Unit-IV	Software Configuration Management	C-37	Lecture
Unit-IV	Implementing Quality Metrics in Projects	C-38	Lecture
Unit-IV	Implementing Quality Metrics in Projects	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom

			Assignment
Unit-IV	Webinar	C-42	Webinar
Unit-V	AI and Machine Learning in Software Quality	C-43	Lecture
Unit-V	AI and Machine Learning in Software Quality	C-44	Lecture
Unit-V	DevOps and Continuous Testing	C-45	Lecture
Unit-V	DevOps and Continuous Testing	C-46	Lecture
Unit-V	Security and Reliability Testing	C-47	Lecture
Unit-V	Security and Reliability Testing	C-48	Lecture
Unit-V	Quality Challenges in Large-Scale Software Development	C-49	Lecture
Unit-V	Quality Challenges in Large-Scale Software Development	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Future Trends in Software Quality Assurance	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Trends in Software Quality Assurance	C-55	Lecture
	Recap of All Units	C-56	Lecture
	Recap of All Units	C-57	Lecture
	Recap of All Units	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14020-Aspect Oriented Programming

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Fundamentals of OOP and Its Limitations	C-1	Lecture
Unit-I	Introduction to AOP	C-2	Lecture
Unit-I	Key Concepts: Cross-Cutting Concerns, Join Points, Pointcuts, Advice	C-3	Lecture
Unit-I	AOP vs OOP	C-4	Lecture
Unit-I	Identifying Cross-Cutting Concerns	C-5	Lecture
Unit-I	Class Assignment	C-6	Class Assignment
Unit-I	Identifying Cross-Cutting Concerns	C-7	Lecture
Unit-I	AOP Frameworks (AspectJ, Spring AOP)	C-8	Lecture
Unit-I	Presentation	C-9	Presentation
Unit-I	AOP Frameworks (AspectJ, Spring AOP)	C-10	Lecture
Unit-II	Understanding Join Points and Pointcuts	C-11	Lecture
Unit-II	Understanding Join Points and Pointcuts	C-12	Lecture
Unit-II	Types of Advice (Before, After, Around)	C-13	Lecture
Unit-II	Clarification Class I	C-14	Clarification Class
Unit-II	Types of Advice (Before, After, Around)	C-15	Lecture
Unit-II	Home Assignments		Home Assignments
Unit-II	Weaving: Compile-Time, Load-Time, Run-Time	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit -II	Classroom Assignment	C-18	Classroom Assignment
Unit -II	AspectJ Syntax and Annotations	C-19	Lecture
Unit -II	Case Study on AOP in Logging	C-20	Lecture
Unit -III	Separation of Concerns and Code Modularity	C-21	Lecture
Unit -III	Separation of Concerns and Code Modularity	C-22	Lecture
Unit -III	Clarification Class II	C-23	Clarification Class
Unit -III	Applying AOP in Enterprise Applications	C-24	Lecture
Unit -III	Applying AOP in Enterprise Applications	C-25	Lecture
Unit -III	Take Home Assignment		Home Assignments
Unit -III	Clarification Class III	C26	Clarification Class
Unit -III	Dependency Injection and IoC	C-27	Lecture
Unit -III	AOP in Service-Oriented Architecture	C-28	Lecture
Unit -III	Clarification Class	C-29	Clarification Class
Unit -III	Guest Lecture	C-30	Guest Lecture
Unit-IV	Integrating AOP with Java, Spring Framework, and Hibernate	C-31	Lecture
Unit-IV	Integrating AOP with Java, Spring Framework, and Hibernate	C-32	Lecture
Unit-IV	AspectJ vs Spring AOP	C-33	Lecture
Unit-IV	AOP for Exception Handling and Security	C-34	Lecture
Unit-IV	AOP for Exception Handling and Security	C-35	Lecture
Unit-IV	AOP in Microservices Architecture	C-36	Lecture
Unit-IV	AOP in Microservices Architecture	C-37	Lecture
Unit-IV	Implementing AOP in Spring	C-38	Lecture
Unit-IV	Best Practices in AOP Implementation	C-39	Lecture
Unit-IV	Clarification Class	C-40	Clarification Class
Unit-IV	Classroom Assignment	C-41	Classroom Assignment
Unit-IV	Webinar	C-42	Webinar

Unit-V	Debugging and Testing AOP Applications	C-43	Lecture
Unit-V	Dynamic Proxying and Bytecode Manipulation	C-44	Lecture
Unit-V	Dynamic Proxying and Bytecode Manipulation	C-45	Lecture
Unit-V	Security Implications and Code Auditing with AOP	C-46	Lecture
Unit-V	Security Implications and Code Auditing with AOP	C-47	Lecture
Unit-V	AOP in Cloud Computing and Distributed Systems	C-48	Lecture
Unit-V	AOP in Cloud Computing and Distributed Systems	C-49	Lecture
Unit-V	Future Trends in AOP	C-50	Lecture
Unit-V	Take Home Assignment	C-51	Take Home Assignment
Unit-V	Future Trends in AOP	C-52	Lecture
Unit-V	Clarification Class	C-53	Clarification Class
Unit-V	Take Home Assignment	C-54	Take Home Assignment
Unit-V	Future Trends in AOP	C-55	Lecture
	Recap of All Units	C-56	Lecture
	Recap of All Units	C-57	Lecture
	Recap of All Units	C-58	Lecture
Unit-V	Presentation	C-59	Presentation
Unit-V	Presentation	C-60	Presentation

CSEE14034- Data Visualization

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Value of Visualization		
Unit-I	What is Visualization and Why do it	C-1	Lecture
Unit-I	External representation	C-2	Lecture
Unit-I	Interactivity	C-3	Lecture
Unit-I	Difficulty in Validation	C-4	Lecture
Unit-I	Clarification Class	C-5	Clarification Class
Unit-I	Class Room Assignment	C-6	Class Room Assignment
Unit-I	Take Home Assignment		Take Home Assignment
Unit-I	Presentation	C-7	Presentation
Unit-I	Data Abstraction: Dataset types- Attribute types – Semantics.		
Unit-I	Task Abstraction – Analyze, Produce, Search, Query.	C-8	Lecture
Unit-I	Four levels of validation – Validation approaches	C-9	Lecture
Unit-I	Validation examples. Marks and Channels	C-10	Lecture
Unit-I	Class Room Assignment	C-11	Class Room Assignment
Unit-II	Rules of thumb	C-12	Lecture
Unit-II	Arrange tables: Categorical regions	C-13	Lecture
Unit-II	Spatial axis orientation	C-14	Lecture
Unit-II	Spatial layout density.	C-15	Lecture
Unit-II	Arrange spatial data: Geometry	C-16	Lecture
Unit-II	Scalar fields	C-17	Lecture
Unit-II	Vector fields – Tensor fields.	C-18	Lecture
Unit-II	Class Room Assignment	C-19	Class Room Assignment
Unit-II	Arrange networks and trees: Connections	C-20	Lecture
Unit-II	Matrix views – Containment	C-21	Lecture
Unit-II	Map color: Color theory, Color maps and other channels.	C-22	Lecture
Unit-II	Clarification Class	C-23	Clarification Class
Unit-II	Presentation	C-24	Presentation
Unit-II	Take Home Assignment		Take Home Assignment
Unit-III	Manipulate view:		
Unit-III	Manipulate view: Change view over time	C-25	Lecture
Unit-III	Manipulate view: Change view over time	C-26	Lecture
Unit-III	Select elements – Changing viewpoint	C-27	Lecture
Unit-III	Select elements – Changing viewpoint	C-28	Lecture
Unit-III	Select elements – Changing viewpoint	C-29	Lecture
Unit-III	Reducing attributes	C-30	Lecture
Unit-III	Facet into multiple views: Juxtapose and Coordinate views	C-31	Lecture
Unit-III	Facet into multiple views: Juxtapose and Coordinate views	C-32	Lecture

Unit-III	Clarification Class	C-33	Clarification Class
Unit-III	Presentation	C-34	Presentation
Unit-III	Take Home Assignment		Take Home Assignment
Unit-III	Class Room Assignment	C-35	Class Room Assignment
Unit-III	Partition into views – Static and Dynamic layers		
Unit-III	Reduce items and attributes: Filter – Aggregate	C-36	Lecture
Unit-III	Focus and context: Elide – Superimpose – Distort – Case studies.	C-37	Lecture
Unit-III	Focus and context: Elide – Superimpose – Distort – Case studies.	C-38	Lecture
Unit-III	Clarification Class	C-39	Clarification Class
Unit-III	Presentation	C-40	Presentation
Unit-III	Take Home Assignment		Take Home Assignment
	Webinar	C-41	Webinar
	Seminar	C-42	Seminar
	Activity	C-43	Activity
	Activity	C-44	Activity
	Guest Lecture	C-45	Guest Lecture

CSEE14035- Data Visualization-Lab

S. No.	Particulars	Class No.	Pedagogy of Class
1	Introduction to various Data Visualization tools	P-1,2	Practical
2	Basic Visualization in Python	P-3,4	Practical
3	Basic Visualization in R	P-5,6	Practical
4	Basic Visualization in R	P-7,8	Practical
5	Introduction to Tableau and Installation	P-9,10	Practical
6	Introduction to Tableau and Installation	P-11,12	Practical
7	Connecting to Data and preparing data for visualization in Tableau	P-13,14	Practical
8	Connecting to Data and preparing data for visualization in Tableau	P-15,16	Practical
9	Connecting to Data and preparing data for visualization in Tableau	P-17,18	Practical
10	Data Aggregation and Statistical functions in Tableau	P-19,20	Practical
11	Data Aggregation and Statistical functions in Tableau	P-21,22	Practical
12	Data Visualizations in Tableau	P-23,24	Practical
13	Basic Dashboards in Tableau	P-25,26	Practical
14	Basic Dashboards in Tableau	P-27,28	Practical

CSEE14036- Big Data Analytics

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Types of Digital Data, Introduction to Big Data	C-1	Lecture
Unit-I	Types of Digital Data	C-2	Lecture
Unit-I	Introduction to Big Data, Big Data Analytics,	C-3	Lecture
Unit-I	History of Hadoop, Apache Hadoop	C-4	Lecture
Unit-I	Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming	C-5	Lecture
Unit-I	Hadoop Echo System	C-6	Lecture
Unit-I	IBM Big Data Strategy	C-7	Lecture
Unit-I	Introduction to Infosphere BigInsights and Big Sheets	C-8	Lecture
Unit-I	Introduction to Infosphere BigInsights and Big Sheets	C-9	Lecture
Unit-I	Introduction to Infosphere BigInsights and Big Sheets	C-10	Lecture
Unit-I	Clarification Class	C-11	Clarification Class
	Take Home Assignment		Take Home Assignments
	Class Room Assignment	C-12	Class Room Assignment
Unit-II	HDFS(Hadoop Distributed File System) The Design of HDFS	C-13	Lecture
Unit-II	HDFS Concepts, Command Line Interface	C-14	Lecture
Unit-II	Hadoop file system interfaces	C-15	Lecture
Unit-II	Data flow, Data Ingest with Flume and Scoop and Hadoop archives	C-16	Lecture
Unit-II	Data flow, Data Ingest with Flume and Scoop and Hadoop archives	C-17	Lecture
Unit-II	Data flow, Data Ingest with Flume and Scoop and Hadoop archives	C-18	Lecture
Unit-II	Hadoop I/O: Compression	C-19	Lecture
Unit-II	Serialization, Avro and File-Based Data structures	C-20	Lecture
Unit-II	Serialization, Avro and File-Based Data structures	C-21	Lecture
Unit-II	Clarification Class	C-22	Clarification Class
	Take Home Assignment		Take Home Assignments
	Class Room Assignment	C-23	Class Room Assignment
	Presentation	C-24	Presentation
	Guest Lecture	C-25,26	Guest lecture
	Quiz-1 /Workshop	C-27	Quiz
Unit-III	Map Reduce Anatomy of a Map Reduce Job Run	C-28	Lecture
Unit-III	Failures, Job Scheduling, Shuffle and Sort	C-29	Lecture
Unit-III	Failures, Job Scheduling, Shuffle and Sort	C-30	Lecture
Unit-III	Task Execution, Map Reduce Types and Formats	C-31	Lecture
Unit-III	Task Execution, Map Reduce Types and Formats	C-32	Lecture

Unit-III	Map Reduce Features	C-33	Lecture
Unit-III	Map Reduce Features	C-34	Lecture
Unit-III	Clarification Class	C-35	Clarification Class
Unit-IV	Hadoop Eco System Pig : Introduction to PIG	C-36	Lecture
Unit-IV	Execution Modes of Pig, Comparison of Pig with Databases	C-37	Lecture
Unit-IV	Grunt, Pig Latin, User Defined Functions	C-38	Lecture
	Take Home Assignment		Take Home Assignments
	Class Room Assignment	C-39	Class Room Assignment
	Presentation	C-40	Presentation
	Webinar	C-41,42	Webinar
	Activity-1 Mind Mapping	C-43	Activity
Unit-IV	Data Processing operators. Hive : Hive Shell	C-44	Lecture
Unit-IV	Hive : Hive Shell, Hive Services, Hive Metastore	C-45	Lecture
Unit-IV	Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions	C-46	Lecture
Unit-IV	Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction	C-47	Lecture
Unit-IV	Class Room Assignment	C-48	Class Room Assignment
Unit-IV	Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS	C-49	Lecture
Unit-IV	Big SQL : Introduction	C-50	Lecture
Unit-IV	Big SQL : Introduction	C-51	Lecture
Unit-V	Data Analytics with R Machine Learning : Introduction,	C-52	Lecture
Unit-V	Data Analytics with R Machine Learning : Introduction,	C-53	Lecture
Unit-V	Supervised Learning	C-54	Lecture
Unit-V	Supervised Learning	C-55	Lecture
Unit-V	Unsupervised Learning	C-56	Lecture
Unit-V	Unsupervised Learning	C-57	Lecture
Unit-V	Collaborative Filtering. Big Data Analytics with BigR	C-58	Lecture
Unit-V	Collaborative Filtering. Big Data Analytics with BigR	C-59	Lecture
	Clarification Class	C-60	Clarification Class

CSEE14037– Software Verification and Validation

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction		
Unit-I	Terminology, error	C-1	Lecture
Unit-I	Fault and failures	C-2	Lecture
Unit-I	Design for testability, objectives	C-3	Lecture
Unit-I	Purpose of testing	C-4	Lecture
Unit-I	Testing technology	C-5	Lecture
Unit-I	Error, terminology	C-6	Lecture
Unit-I	Type of Debugging	C-7	Lecture
Unit-I	Design principles	C-8	Lecture
Unit-I	Clarification class 1	C-9	Clarification Class
Unit-I	Presentation 1	C-10	Presentation
Unit-I	Class room assignment 1	C-11	Class Assignment
	Guest lecture	C-12	Guest lecture
Unit-II	Limitations, Role of V&V in Software Evolution, Testing Techniques and Strategies		
Unit-II	Theoretical foundations: impracticality of testing all data	C-13	Lecture
Unit-II	Types of Products: requirements, specifications, designs, implementations, changes	C-14	Lecture
Unit-II	V&V objectives: correctness, consistency, necessity, sufficiency, performance	C-15	Lecture
Unit-II	Static and dynamic testing, software technical reviews	C-16	Lecture
Unit-II	Software testing: levels of testing - module, integration	C-17	Lecture
Unit-II	System, regression, Testing techniques	C-18	Lecture
Unit-II	Structural testing and analysis, error-oriented testing and analysis	C-19	Lecture
Unit-II	Integration strategies, transaction flow analysis, stress analysis, failure analysis	C-20	Lecture
Unit-II	Applicability-functional testing and analysis	C-21	Lecture
Unit-II	Impracticality of testing all paths, no absolute proof of correctness	C-22	Lecture
Unit-II	Hybrid approaches	C-23	Lecture
Unit-II	Concurrency analysis, performance analysis	C-24	Lecture
Unit-II	Presentation 2	C-25	Presentation
Unit-II	Clarification class 2	C-26	Clarification Class
Unit-II	Classroom assignment 2	C-27	Class Assignment
	Webinar 1	C-28	Webinar
	Take home assignment 1		Home Assignments
Unit-III	Flow graphs and Path Testing, Transaction Flow Testing, Data Flow Testing		
Unit-III	Flow graphs and Path Testing	C-29	Lecture
Unit-III	Path testing basics, path predicates	C-30	Lecture
Unit-III	Transaction flow testing	C-31	Lecture
Unit-III	Generalizations, transaction flows, data flow	C-32	Lecture

	testing		
Unit-III	Activity-1	C-33	Lecture
Unit-III	Basics of Data flow model	C-34	Lecture
Unit-III	Data flow testing strategies, Applications	C-35	Lecture
Unit-III	Transaction flow testing, data flow testing	C-36	Lecture
Unit-III	Application of Path Testing	C-37	Lecture
Unit-III	Transaction-Flow testing techniques	C-38	Lecture
Unit-III	Applications of Data flow testing strategies	C-39	Lecture
Unit-III	Presentation 3	C-40	Presentation
	Clarification class 3	C-41	Clarification Class
	Classroom assignment 3	C-42	Class Assignment
	Workshop 1	C-43	Workshop
	Take home assignment 2		Home Assignments
	Quiz 1	C-44	Quiz
Unit-IV	Software Testing and Regular Expression, Program Mutation Testing, Laboratory Work		Lecture
Unit-IV	Software Testing and Regular Expression: Path products, path sums, Loops, Reduction procedure, Applications	C-45	Lecture
Unit-IV	Approximate number of paths, The mean processing time of any routine	C-46	Lecture
Unit-IV	Regular expression and Flow-anomaly detection	C-47	Lecture
Unit-IV	Presentation 4	C-48	Presentation
Unit-IV	Class room assignment 4	C-49	Class Assignment
Unit-IV	Take home assignments 3		Home Assignments
Unit-IV	Program Mutation Testing: Introduction, Mutation and mutants, Mutation operators, Equivalent mutants	C-50	Lecture
Unit-IV	Laboratory Work: Developing various exercises like cyclomatic complexity	C-51	Lecture
Unit-IV	Fault detection using mutants, Types of mutants	C-52	Lecture
Unit-IV	Activity-2	C-53	Activity
Unit-IV	Mutation operators for C and Java.	C-54	Lecture
Unit-IV	Boundary value analysis and data flow testing etc.	C-55	Lecture
Unit-IV	Developing a small project/tool to generate test data	C-56	Lecture
Unit-IV	Execute test data etc. Exposure to automated testing tool	C-57	Lecture
Unit-IV	Clarification class 4	C-58	Clarification Class
	Webinar 2	C-59	Webinar
	Seminar	C-60	Seminar

Note: The review of Syllabus happens on a periodic basis for the benefit of the students. In case there are changes in curriculum due to review, students would be intimated in writing

----------**End of document**----------