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KARNATAK LAW SOCIETY'S

GOGTE INSTITUTE OF TECHNOLOGY

ESTD. 1979

"JNANA GANGA" UDYAMBAG, BELAGAVI-590008, KARNATAKA, INDIA.

Approved by AICTE and UGC

Permanently Affiliated and Autonomous Institution

Under

Visvesvaraya Technological University, Belagavi

www.git.edu

Master of Technology

Scheme and Syllabus (2022-23 Scheme)

Detailed Scheme & Syllabus (2nd Semester)

(Computer Science & Engineering)

INSTITUTION VISION
• Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity and entrepreneurial skills.

MISSION
• To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

QUALITY POLICY
• Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment. • Fostering cultural, ethical, moral and social values in the human resources of the institution. • Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

DEPARTMENT VISION
To be a center of Excellence for Education, Research and Entrepreneurship in Computer Science and Engineering in creating professionals who are competent to meet emerging challenges to benefit society.

DEPARTMENTMISSION
To impart and strengthen fundamental knowledge of students, enabling them to cultivate professional skills, entrepreneurial and research mindset with right attitude and aptitude.

Scheme of Teaching and Examinations–2022

M.Tech., Computer Science and Engineering

Choice Based Credit System(CBCS)and Outcome-Based Education(OBE)

II SEMESTER

Sl.No	Course	Course Code	Course Title	Teaching Hours/Week			Examination				Credit
				Theory	Tutorial/SDA	Practical	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P					
1	IPCC	22SCS21	Artificial Intelligence and Machine Learning	04	00	02	03	100	100	200	5
2	IPCC	22SCS22	Internet of Things and Applications	03	00	02	03	100	100	200	4
3	PEC	22SCS23x	Professional elective 1	02	02	00	03	100	100	200	3
4	PEC	22SCS24x	Professionalelective2	02	02	00	03	100	100	200	3
5	MPS	22SCS25	Mini Project with Seminar	00	02	04	--	100	--	100	3
TOTAL				**11**	**06**	**08**	**12**	**500**	**400**	**900**	**18**

Note: PCC: Professional core courses, PEC: Professional Elective Courses, IPCC-Integrated Professional Core Courses. MPS-Mini Project With Seminar; AUD/AEC; Audit Courses/ Ability Enhancement Courses(Mandatory), PCCL-Professional Core Course lab,**L-Lecture,P-Practical,T/SDA-Tutorial/SkillDevelopmentActivities**(HoursareforInteractionbetweenfacultyandstudents)

Professional Elective 1		**Professional Elective 2**	
Course Code under 22SCS23X	**Course title**	**Course Code under 22SCS24X**	**Course title**
22SCS231	Advances in Database Management System	22SCS241	Advances in Storage area Networks
22SCS232	Robotic Process Automation	22SCS242	Natural Language Processing & Text Mining
22SCS233	5G Technology	22SCS243	Advances in Operating system
22SCS234	Advances in Computer Networks	22SCS244	Mobile & Pervasive Computing
22SCS235	Data Mining & Data Warehousing	22SCS245	Cloud Security

Note:

1 Mini Project with Seminar: This may be hands-on practice, survey report, data collection and analysis, coding, mobile app development, field visit and report preparation, modeling of system, simulation, analyzing and authenticating, case studies, etc.

CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. Students can present the seminar based on the completed mini-project. Participation in the seminar by all postgraduate students of the program shall be mandatory.

The CIE marks awarded for Mini-Project work and Seminar, shall be based on the evaluation of Mini Project work and Report, Presentation skill and performance in Question and Answer session in the ratio 50:25:25. Mini-Project with Seminar shall be considered as a head of passing and shall be considered for vertical progression as well as for the award of degree. Those, who do not take-up/complete the Mini Project and Seminar shall be declared as fail in that course and have to complete the same during the subsequent semester. There is no SEE for this course.

2. Internship: All the students shall have to undergo a mandatory internship of 06 weeks during the vacation of II and III semesters. A University examination shall be conducted during III semester and the prescribed internship credit shall be counted in the same semester. The internship shall be considered as a head of passing and shall be considered for vertical progression as well as for the award of degree. Those, who do not take-up/complete the internship shall be declared as fail in the internship course and have to

Complete the same during the subsequent University examination after satisfying the internship requirements.

Artificial Intelligence and Machine Learning					
Course Code	22SCS21	**Course type**	IPCC	**Credits L-T-P**	4 – 0 – 1
Hours/week: L-T-P	4 – 0 – 2			**Total credits**	5
Total Contact Hours	L = 40Hrs; T = 00Hrs;P = 10Hrs Total = 50Hrs			**CIE Marks**	100
Flipped Classes content	06 Hrs			**SEE Marks**	100

Course learning objectives	
1.	To understand different logical systems for inference over formal domain representations and trace how a particular inference algorithm works on a given problem specification
2.	To understand various artificial intelligence techniques and agent technology
3.	To Understand and apply appropriate game playing and planning strategies for a given problem specification

Pre-requisites: Discrete Mathematical Structures, Probability.

Unit – I	10 Hours
Introduction to Artificial Intelligence: Introduction, What is AI, Strong Methods and weak Methods. Uses and Limitations: **Knowledge Representation:** Need for good representation, semantic nets, Frames, Search Spaces, Semantics Tress, Search Trees, Combinatorial Explosion, Problem reduction, Goal Trees, Combinatorial Explosion	

Unit – II	10 Hours
Search Methodologies: Introduction, Problem solving as search, Data driven or goal driven search, Generate and test, Depth First Search, Breadth First Search, Properties of search methods, Implementing Depth-First and Breadth-First Search, Using Heuristics for Search, Hill Climbing, Best-First Search, Identifying Optimal Paths, Constraint Satisfaction search, Forward Checking, Local Search and Meta heuristics, Simulated Annealing. Genetic Algorithms for search, Real time A*, Bidirectional search	

Unit – III	10 Hours
Game Playing: Game Trees, Minimax, Alpha beta pruning, Checkers, Chess **Prepositional and Predicate Logic:** Introduction, What is Logic, Why Logic is used in Artificial Intelligence, Logical Operators, Translating between English and Logic Notation, Truth Tables: Not, And, Or, Implies, if, Complex Truth Tables, Tautology, Equivalence, Propositional logic, Deduction, The deduction Theorem, Soundness, Completeness, Decideability, Monotonicity, Abduction and Inductive reasoning,	

Unit – IV	10 Hours
Introduction, Training Rote Learning, Learning Concepts, General-to-Specific Ordering,Version Spaces, Candidate Elimination, Inductive Bias, Decision-Tree Induction, The Problem of Overfitting, The Nearest Neighbor Algorithm, Backpropagation algorithms, Reinforcement Learning. Neural Networks: Introduction, Neurons, Perceptrons, Multilayer Neural Networks, RecurrentNetworks, Unsupervised Learning Networks, Evolving Neural Networks. **Self-learning topics: Supervised Learning, Unsupervised Learning**	

Unit – V	10 Hours
Probabilistic Reasoning and Bayesian Belief Networks: Introduction, Probabilistic Reasoning, Joint Probability Distributions, Bayes' Theorem, Simple Bayesian Concept Learning, Bayesian Belief Networks, The Noisy-V Function, Bayes' Optimal Classifier, The Naïve Bayes Classifier. **Self-learning topics: Collaborative Filtering**	

Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	2	2	2	2	2

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	Implement DFID algorithm and compare its performance with DFS and BFS algorithm
		Implement Best-First Search algorithm
2	1	Implementation of AND/OR Gate using single layer perceptron.
3	1	Implementation of XOR Gate using a) Multi-layer perceptron
4	2	Implementation of Hebbian learning rule
		Implementation of Find-S algorithms
5	2	Build a linear regression model housing prices.
		Implement spam detection using Naïve Bayes Algorithm

Self Study Topics	
Unit No.	**Topic description**
I	Inheritance, Object Oriented Programming
II	Nondeterministic search, non-chronological backtracking
III	Modal logics and possible worlds, Dealing with change
IV	Backward Chaining, CYC
V	Braitenberg Vehicles

Books	
	Text Books:
1.	Ben Coppin, Artificial Intelligence Illuminated, Jones and Bartlett Publishers, 1st Edition, 2004 onwards
	Reference Books:
1.	Elaine Rich Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition 2013 onwards
2.	Stuart Russel, Peter Norvig: Artiificial Intelligence A Modern Approach, Pearson 3rd edition 2013 onwards
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://nptel.ac.in/courses/106/105/106105077/

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	**Design** intelligent agents for problem solving, reasoning, planning, decision making and learning for specific design and performance constraints and when needed, design variants of existing algorithms.	L4	1,3	1,2,3
2.	**Apply** AI techniques on current applications.	L3	1,2	1
3.	**Demonstrate** ability for problem solving, knowledge representation, reasoning and learning.	L3	1,3	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (60 marks)			LAB (40 marks)		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	10 marks	30 marks	100 marks
IA Test:					

1. No objective part in IA question paper 2. All questions descriptive
Conduct of Lab: 1. Conducting the experiment and journal: 5 marks 2. Calculations, results, graph, conclusion and Outcome: 5 marks
Lab test: (Batch wise with 15 students/batch) 1. Test will be conducted at the end of the semester 2. Timetable, Batch details and examiners will be declared by Exam section 3. Conducting the experiment and writing report: 5 marks 4. Calculations, results, graph and conclusion: 15 marks 5. Viva voce: 10 marks
Eligibility for SEE: 1. 50% and above (30 marks and above) in theory component 2. 50% and above (20 marks and above) in lab component 3. **Lab test is COMPULSORY** 4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be ≥ 40% &, however overall score of CIE+SEE should be ≥ 50%.
3.	Question paper contains three parts **A,B and C**. Students have to answer 1. From Part A answer any 5 questions each Question Carries 6 Marks. 2. From Part B answer any one full question from each unit and each Question Carries 10 Marks. 3. From Part C answer any one full question and each Question Carries 20 Marks.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔		✔	✔	✔	✔
2	✔	✔		✔		
3	✔		✔	✔	✔	✔
Tick mark the CO, PO and PSO mapping						

Internet of Things					
Course Code	**22SCS22**	**Course type**	IPCC	**Credits L-T-P**	3 – 0 – 1
Hours/week: L-T-P	3 – 0 – 2			**Total credits**	4
Total Contact Hours	L = 40Hrs; T = 00Hrs;P = 10Hrs Total = 50Hrs			**CIE Marks**	100
Flipped Classes content	06 Hrs			**SEE Marks**	100

Course learning objectives	
1.	To understand the physical, logical design and the protocols in IOT.
2.	To understand the IOT architecture and protocol stack.
3.	To learn the various components and modes of communications with IOTs.
4.	To understand the address capabilities and mobile technologies of IOT.
5	To discuss about the cloud and IOT environment.

Pre-requisites:1. Fundamentals of Basic Electronics.

2. Fundamentals of Communication and ComputerNetwork.

Unit – I	**8 Hours**
INTRODUCTION TO INTERNET OF THINGS: What is the Internet of Things? Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities, Physical Design of IoT: IoT Protocols, Logical Design of IoT: Functional block, communication Model, Communication API's, IoT Enabling Technologies: WSN, cloud computing, Big data Analytics, communication Protocols, Embedded systems, IoT levels and Deployment templates: Level 1 to Level 5.	

Unit – II	**8 Hours**
IoT NETWORK ARCHITECTURE AND DESIGN: The one M2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture, IoT protocol stack, The Core IoT Functional Stack, IoT Data Management and Compute Stack: Fog Computing, Edge Computing, The Hierarchy of Edge, Fog, and Cloud IoT and M2M: Introduction to M2M, Difference between IoT and M2M, SDN and NFV for IoT.	

Unit – III	**8 Hours**
SMART OBJECTS: THE "THINGS" IN IoT : Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and 802.15.4e, IEEE 1901.2a, LoRaWAN.	

Unit – IV	**8 Hours**
ADDRESSING TECHNIQUES FOR THE IoT: Address Capabilities, IPv6 Protocol Overview, IPv6 Tunneling, IPsec in IPv6, Header Compression Schemes, Quality of Service in IPv6, Migration Strategies to IPv6, Mobile IPV6 technologies for the IoT: Protocol	

Details, IPv6 over low-power WPAN (6LoWPAN).	
Unit – V	**8 Hours**
IoT PLATFORMS AND CLOUD OFFERINGS: What is an IoT Device, Exemplary Devices: Raspberry Pi, Raspberry Pi Interfaces, Other IoT Devices: pcDuino, Beagle Bone Black, CubieBoard, ARDUINO, Introduction to cloud storage models and communication API's, WAMP-AutoBahn for IoT, Python web application framework.	

Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	2	2	2	2	2

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	2	Transmit a string using UART
		Point-to-Point communication of two Motes over the radio frequency
2	1	Multi-point to single point communication of Motes over the radio frequency. AN (Subnetting).
3	1	I2C protocol study
4	2	Reading Temperature and Relative Humidity value from the sensor
		Study of Connectivity and Configuration of Raspberry-Pi/ Beagle Board circuit with basic peripherals, LEDs, Understanding GPIO and its use in program.
5	2	Study of different operating systems for Raspberry Pi / Beagle board. Understanding the process of Os installation on Raspberry – Pi/ Beagle board.
		Familiarization with the concept of IOT, Arduino / Raspberry Pi and perform necessary software installation.

Books	
	Text Books:
1.	Internet of Things: A Hands-On Approach ArshdeepBahga, Vijay Madisetti VPT – Paperback 2015 978- 0996025515 628/-2.
2.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things David Hanes, Gonzalo Salgueiro, Patrick Grossetete Cisco Press – Paperback – 16 Aug 2017 978-1- 58714-456- 1599.
3.	BuildingtheInternetofThingswithIPv6andMIPv6:TheEvolvingWorldofM2M

	Communications Daniel MinoliWilly Publication s - 2013 978-1-118- 47347-4, 466.
4.	
	Reference Books:
1.	Smart Internet of things projects AgusKurniawanPackt - Sep 2016 978-1- 78646- 651-8 2 The Internet of Things Key Olivier Willy Publication 2nd Edition978
2.	ApplicationsandprotocolsHersents119-99435-0,3TheInternetofThingsConnecting Objects to the Web HakimaChaouchi, Willy Publications 978-1- 84821- 140-7.

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	Identify the various components and explain the policies, challenges and issues in the field of IOT	L2	1	1
2.	Apply the basic principles and demonstrate the skill of proposing suitable solutions to design problems relating to IOT	L3	1	1
3.	Propose the design of IOT systems and develop the software for sensors and controllers	L5	1,2,3	1,2,3
4.	Develop schemes for the applications of IOT in real time scenarios	L5	1,2,3	2,3

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (60 marks)			**LAB (40 marks)**		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	10 marks	30 marks	100 marks

IA Test:

1. No objective part in IA question paper
2. All questions descriptive

Conduct of Lab: 1. Conducting the experiment and journal: 5 marks 2. Calculations, results, graph, conclusion and Outcome: 5 marks
Lab test: (Batch wise with 15 students/batch) 1. Test will be conducted at the end of the semester 2. Timetable, Batch details and examiners will be declared by Exam section 3. Conducting the experiment and writing report: 5 marks 4. Calculations, results, graph and conclusion: 15 marks 5. Viva voce: 10 marks
Eligibility for SEE: 1. 50% and above (30 marks and above) in theory component 2. 50% and above (20 marks and above) in lab component 3. **Lab test is COMPULSORY** 4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be ≥ 40% &, however overall score of CIE+SEE should be ≥ 50%.
3.	Question paper contains three parts **A,B and C**. Students have to answer 1. From Part A answer any 5 questions each Question Carries 6 Marks. 2. From Part B answer any one full question from each unit and each Question Carries 10 Marks. 3. From Part C answer any one full question and each Question Carries 20 Marks.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔			✔		
2	✔			✔		
3	✔	✔	✔	✔	✔	✔
4	✔	✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

Advances in Database Management System					
Course Code	**22SCS231**	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To discuss the concept of databases, ER Modeling and Schema mapping
2.	To understand the application of different query languages and query optimizations.
3.	To introduce a formal database design approach through various normal forms and study the importance of concurrent transactions and control algorithms.
4.	To discuss applications of Object Oriented database.
5	To understand parallel and distributed databases and its applications.

Pre-requisites : Database Management System.

Unit – I	8 Hours
Introduction: Introduction to database, Characteristics of Database approach, Advantages of using DBMS approach, Three-schema architecture and data independence, Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationships, Relationship types, Roles and Structural Constraints; Weak Entity Types. ER-Relational Mapping Rules.	

Unit – II	8 Hours
Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. **Transaction Processing Concepts**: Introduction to Transaction processing, Transaction and System concepts, Desirable properties of Transactions and issues with concurrent transactions. 2PL and TSO algorithms	

Unit – III	8 Hours
SQL: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries; Nested and Correlated Queries, IN, ALL, EXIST operators. Insert, Delete and Update statements in SQL. Introduction to Query Optimization techniques;	

Unit – IV	8 Hours
Object and Object-Relational Databases: Overview of OOP; Complex objects; Identity, structure etc. Object model of ODMG, Object definition Language ODL; Object Query Language OQL; Conceptual design of Object database. Overview of object relational features of SQL; Object-relational features of Oracle; Implementation and related issues for extended type systems; syntax and demo examples.	

Unit – V	8 Hours
Parallel and Distributed Databases: Architectures for parallel databases; Parallel query evaluation; Parallelizing individual operations; Parallel query optimizations; Introduction to distributed databases; Distributed DBMS architectures; Storing data in a Distributed DBMS; Distributed catalog management; Distributed Query processing; Distributed transactions; Distributed Concurrency control and Recovery.	

Unit No.	Self-Study Topics
I	Actors on the scene & workers behind the scene
II	Functional dependency
III	Complex queries
IV	Abstract data types
V	Updating distributed data

Books	
	Text Books:
1.	Elmasri and Navathe: Fundamentals of Database Systems, Pearson Education, 2013.
2.	Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 3rd Edition,McGraw-Hill, 2013.
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://nptel.ac.in/courses/106/106/106106095/

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	Flipped Classes	3.	Open Book Assignment (OBA)
4.	Online classes	4.	Course Seminar
		5.	Semester End Examination

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	**Analyze** the given database applications using E-R diagrams and apply the normalization to produce schema diagrams and relations.	L3	1	1
2.	**Explain** the concepts of object oriented databases , SQL concepts and transaction processing.	L3	1	1
3.	**Apply** SQL language to design different Database applications.	L4	1,2,3	1,2,3
4.	**Analyze**appropriate high performance database like parallel and distributed database	L4	1,2,3	2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
OBA- Open Book Assignment **Minimum score to be eligible for SEE: 50 OUT OF 100**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔			✔		
2	✔			✔		
3	✔	✔	✔	✔	✔	✔
4	✔	✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

Robotic Process Automation					
Course Code	**22SCS232**	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To understand Basic Programming concepts and the underlying logic/structure
2.	To Describe RPA , where it can be applied and how its implemented
3.	To Describe the different types of variables, Control Flow and data manipulation techniques
4.	To Understand Image, Text and Data Tables Automation
5.	To Describe automation to Email and various types of Exceptions and strategies to handle

Pre-requisites : Basics of Programming

Unit – I	8 Hours
PROGRAMMING BASICS & RECAP Programming Concepts Basics - Understanding the application - Basic Web Concepts - Protocols - Email Clients -. Data Structures - Data Tables - Algorithms - Software Processes - Software Design - Scripting - .Net Framework - .Net Fundamentals - XML - Control structures and functions - XML Variables & Arguments	

Unit – II	8 Hours
RPA CONCEPTS RPA Basics - History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Developemt methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Proccess Design Document/Solution Design Document	

Unit – III	8 Hours
RPA TOOL INTRODUCTION & BASICS Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data	

Unit – IV	8 Hours
ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES Recording and Advanced UI Interaction - Recording Introduction - Basic and Desktop Recording - Web Recording - Input/Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - - Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF.	
Unit – V	**8 Hours**
EMAIL AUTOMATION & EXCEPTIONAL HANDLING Email Automation - Email Automation - Incoming Email automation - Sending Email automation - Debugging and Exception Handling - Debugging Tools	

Self Study Topics	
Unit No.	**Topic description**
I	HTML, CSS
II	Industries best suited for RPA - Risks & Challenges with RPA and emerging ecosystem.
III	Data Manipulation - Gathering and Assembling Data
IV	Excel and Data Table basics - Data Manipulation in excel
V	Strategies for solving issues - Catching errors

Books	
	Text Books:
1.	Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing Release Date: March 2018ISBN: 9781788470940
	Reference Books:
1.	Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren

	Livingston (Author), Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation.
2.	Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant
3.	SrikanthMerianda,Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://www.uipath.com/rpa/robotic-process-automation

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	Flipped Classes	3.	Open Book Assignment (OBA)
4.	Online classes	4.	Course Seminar
		5.	Semester End Examination

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	**Apply** and Implement RPA	L3	1.2	1,3
2.	**Explain** Image, Text and Data Tables Automation, E-mail automation and various types of exceptions and strategies to handle	L2	1	1
3.	**Design** RPA solution for real world problems	L5	1,2,3	2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100

OBA- Open Book Assignment
Minimum score to be eligible for SEE: 50 OUT OF 100

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.

3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				CO-PSO Mapping(Planned)		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔	✔		✔		✔
2	✔			✔		
3	✔	✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

5G Technology					
Course Code	22SCS233	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To understand the evolution of wireless technologies from 1G to 5G.
2.	To learn the requirements of 5G communication technology in the present industry applications.
3.	To understand the need of Multi-type and Device-to-Device (D2D) Communications in the 5G wireless Systems
4.	To illustrate the mode of multiple access in 5G technologies.
Pre-requisites: Concept of Computer Networks and wireless communication.	

Unit – I	8 Hours
Introduction: Historical background: Industrial and technological revolution: from steam engines to the Internet, Mobile communications generations: from 1G to 4G, From mobile broadband (MBB) to extreme MBB, IoT: relation to 5G. From ICT to the whole economy. Rationale of 5G: high data volume, twenty-five billion connected devices and wide requirements, Security. Global initiatives: METIS and the 5G-PPP, China: 5G promotion group, Korea: 5G Forum, Japan: ARIB 2020 and Beyond Ad Hoc,	

Unit – II	8 Hours
5G use cases and system concept: 5G Use cases and requirements: Use cases, Requirements and key performance indicators. 5G system concept: Concept overview, Extreme mobile broadband, Massive machine-type communication, Ultra-reliable machine-type communication, Dynamic radio access network.	

Unit – III	8 Hours
The 5G architecture: Introduction: NFVand SDN, Basics about RAN architecture. High-level requirements for the 5G architecture, Functional architecture and 5G flexibility: Functional split criteria, Functional split alternatives, Functional optimization for specific applications, Integration of LTE and new air interface to fulfill 5G requirements, Enhanced Multi-RAT coordination features. Physical architecture and 5G deployment: Deployment	

enablers.

Unit – IV	8 Hours
Machine-type communications: Introduction: Use cases and categorization of MTC, MTC requirements. Fundamental techniques for MTC: Data and control for short packets, Non-orthogonal access protocols. Massive MTC: Design principles,	

Unit – V	8 Hours
The 5G radio-access technologies: Access design principles for multi-user communications: Orthogonal multiple-access systems, Spread spectrum multiple-access systems, Capacity limits of multiple-access methods. Multi-carrier with filtering: a new waveform: Filter-bank based multi-carrier, Universal filtered OFDM. Non-orthogonal schemes for efficient multiple access: Non-orthogonal multiple access (NOMA).	

Self-Study Topics	
Unit No.	**Topic description**
1	Other 5G activities, IoT activities, Standardization activities: ITU-R, 3GPP, IEEE
2	Lean system control plane, Localized contents and traffic flows.
3	Flexible function placement in 5G deployments.
4	MTC Technology components and 5G D2D RRM concept: an example.
5	Sparse code multiple access (SCMA), Interleave division multiple access (IDMA).

Books	
	Text Books:
1.	AfifOsseiran, Jose F. Monserrat, Patrick Marsch, "5G Mobile and Wireless Communications Technology", Cambridge University Press, Edition 1/year 2016 and onwards
	Reference Books:
1.	Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley Publishing, Inc., Indianapolis, Indiana, 2003 and onwards
2.	Raj kamal: Mobile Computing, Oxford University Press, 2007 and onwards.
3.	ItiSahaMisra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009 and onwards.
	E-resources (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://onlinecourses.nptel.ac.in/noc19_ee48/preview

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Online Quizzes (Surprise and Scheduled)
3.	Flipped Classes	3.	Open Book Assignment (OBA)
4.	Online classes	4.	Course Seminar

		5.	Semester End Examination

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	Demonstrate the Growth of wireless communication till 5G	L3	1	1
2.	Elucidate the need of 5G in latest communication requirements	L2	1	1
3.	Explore the futuristic communication technologies like Multi-type and Device-to-Device (D2D) Communications in the 5G wireless Systems	L3	1,2,3	1,2,3
4.	Illustrate the mode of multiple accesses in 5G communication technologies	L2	2,3	2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100

OBA- Open Book Assignment
Minimum score to be eligible for SEE: 50 OUT OF 100

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔			✔		
2	✔			✔		
3	✔	✔	✔	✔	✔	✔
4		✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

Advances in Computer Networks					
Course Code	22SCS234	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To become familiar with Computer Networks and the concepts of protocols.
2.	To learn the concepts Wired and Wireless LANs
3.	To learn the concept of Logical Addresses, Address Mapping, Error Reporting and Multicasting
4.	To understand the aspects of Network Security and Management.

Pre-requisites: Knowledge of Computer Networks.

Unit – I	8 Hours

Foundation

BuildingaNetwork,Requirements,Perspectives,ScalableConnectivity,Cost-EffectiveResourcesharing,SupportforCommonServices,Manageability and Performance.

Advanced Internetworking

The Global Internet**:** Routing Areas, Interdomain Routing (BGP)

Unit – II	8 Hours

End-to-EndProtocols

SimpleDe-multiplexer(UDP);ReliableByteStream(TCP): End-to-EndIssues,SegmentFormat,ConnectingEstablishmentandTermination,TriggeringTransmission, AdaptiveRetransmission,TCPExtensions; Remote Procedure Call: RPC Fundamentals, RPC Implementations (SunRPC, DCE)

Congestion Control and Resource Allocation

Issues in Resource Allocation: Network Model, Taxonomy and Evaluation Criteria;Queuing Disciplines:FIFO,FairQueuing;TCPCongestionControl:AdditiveIncrease/MultiplicativeDecrease,SlowStart,FastRetransmitandFastRecovery.

Unit – III	8 Hours

Wired LANs: Ethernet:

IEEE Standards: Data Link Layer, Physical Layer; Standard Ethernet: MAC Sublayer, Physical Layer; Changes in the Standard: Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet; Fast Ethernet: Mac Sublayer, Physical Layer;

Wireless LANs:

IEEE 802.11: Architecture, Mac Sublayer, Addressing Mechanism, Physical Layer; Bluetooth: Architecture, Bloetooth Layers, Radio Layers, Baseband Layers, L2CAP.

Unit – IV	8 Hours
Logical Addresses: IPv4 Addressing: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation; IPv6Addresses: Structure, Address Space. **Address Mapping, Error Reporting and Multicasting:** Address Mapping: Mapping Logical to Physical Address: ARP, Mapping Physical to Logical Addressing: RARP,BOOTP and DHCP; ICMP: Types of Messages, Message Format, Error Reporting, Query, Debugging; IGMP: Group Management, IGMP Messages, Message Format, IGMP Operation, Encapsulation, Netsat Utility.	

Unit – V	8 Hours
Network Security Security Services: Message Confidentiality, Integrity, Authentication, Nonrepudiation, Entity Authentication; Message Confidentiality: with Symmetric and Asymmetric Key Cryptography; Message Authentication; Digital Signature: Comparison, Need for Key, Process, Services, Signature Schemes; **NetworkManagement** What Is Network Management? The Infrastructure for NetworkManagement, The Internet-Standard Management Framework, Structure of ManagementInformation: SMI, Management Information Base: MIB.	

Self Study Topics	
Unit No.	**Topic description**
1	Introduction to IP Version 6
2	TCP Performance, Remote Procedure Call.
3	Gigabit Ethernet
4	ICMPv6
5	Message Integrity.

Books	
	Text Books:
1.	Larry Peterson and Bruce S Davis “Computer Networks :A System Approach” 5th Edition, Elsevier -2014
2.	Behrouz A. Forouzan, “Data Communications and Networking”, McGraw-Hill, 4th Edition and onwards
3.	James F. Kurose, Keith W. Ross, Computer Networking A Top down Approach, 7th Edition, Pearson, 2001.
	Reference Books:
1.	Andrew S. Tenenbaum, “Computer Networks”, Pearson, 4th Edition and onwards.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab

			Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	Explain the layered nature of network services, protocols, and architectures by listing and classifying them..	L1	1	1
2.	Develop efficient communication systems by utilizing connection creation, queuing theory, and recovery strategies.	L4	1,2	1,2
3.	Explain the use of TCP for routing in Ad-hoc networks.	L2	1,3	1,3
4.	Applysecurity and management standards to manage practical networks .	L3	2,3	2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100

OBA- Open Book Assignment

Minimum score to be eligible for SEE: 50 OUT OF 100

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				CO-PSO Mapping(Planned)		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔			✔		
2	✔	✔		✔	✔	
3	✔		✔	✔		✔

4		✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

Data Mining and Data Warehousing					
Course Code	**22SCS235**	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To introduce the basic concepts and techniques of data mining and data warehousing.
2.	To develop the skills using recent data mining software for solving practical problems.
3.	To assess the strengths and weaknesses of various data mining methods and algorithms.

Pre-requisites: Database Management System, Information Management.

Unit – I	**8 Hours**
Introduction and Data Preprocessing :Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted, Major issues in data mining .Data Preprocessing: An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.	

Unit – II	**8 Hours**
What is a Data Warehouse?, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data warehousing to Data Mining.	

Unit – III	**8 Hours**
Classification and Prediction: Issues regarding Classification and Prediction, classification by Decision tree induction, Bayesian classification, Rule-Based classification, Classification Based on the concepts from association rule mining. Other classification methods, prediction.	

Unit – IV	**8 Hours**

Cluster Analysis: What is Cluster Analysis? Types of data in cluster Analysis: a Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Model-Based Clustering Methods: Statistical Approach, Neural Network Approach Outliner Analysis.

Unit – V	**8 Hours**

Self-Study Topics	
Unit No.	**Topic description**
1	Real life examples of data mining.
2	Case study of Data warehousing.
3	Genetic Algorithm, KNN classifier
4	Outlier Detection Methods
5	Multidimensional Data Analysis in Cube Space

Application and Trends in Data Mining: Data mining application, Data mining system Products research Prototypes, Additional Themes on Data Mining, Data Mining and Intelligent Query Answering, Trends in Data Mining.

Books	
	Text Books:
1.	Jiawei Han, Michelin Kamber, "Data Mining Concepts and Techniques", Morgan KaufMann Publishers, 3rd edition, July 2011.
	Reference Books:
1.	Alex Berson and Stephen J Smith, "Data Warehousing, Data Mining and OLAP" (Data Warehousing/Data Management). New Delhi : Tata Mcgraw-Hill, 2004.
2.	Arun K Pujari, "Data Mining Techniques", Universities Press, Oct 2013.
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	
2.	

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

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Course Outcome (COs) **Learning Levels:** **Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**				
At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	**Demonstrate** storing voluminous data for online processing and preprocess the data for mining applications.	L3	1	1
2.	**Design and deploy** appropriate classification techniques.	L4	1,2	1,2
3.	**Apply** clustering the high dimensional data for better organization of the data.	L3	1,3	1,3
4.	**Demonstrate** the classification, Regression & clustering technique.	L3	2,3	2,3
5.	**Describe** the basic principles and algorithms used in practical data mining and understand their strengths and weaknesses.	L2	1,2,3	2,3

4.	Apply security and management standards to manage practical networks.	L3		

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
OBA- Open Book Assignment **Minimum score to be eligible for SEE: 50 OUT OF 100**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				CO-PSO Mapping(Planned)		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔			✔		
2	✔	✔		✔	✔	
3	✔		✔	✔		✔
4		✔	✔		✔	✔
5	✔	✔	✔		✔	✔
Tick mark the CO, PO and PSO mapping						

Advances in Storage Area Networks					
Course Code	22SCS241	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30 Hrs; T = 10 Hrs; P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	To study Storage Area Networks characteristics and its components.
2.	Introduce storage virtualization and bring out its importance.
3.	Analyze different networked storage options for different application environments

Pre-requisites : Networks, Operating Systems

Unit – I	**8 Hours**
Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage networks The Data Storage and Data Access problem; The Battle for size and access. Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.	
Self-learning topics:	

Unit – II	**8 Hours**
I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS	
Self-learning topics:	

Unit – III	**8 Hours**

Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.
Self learning topics:

Unit – IV	**8 Hours**
SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective. Software Components of SAN: The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs.	
Self learning topics:	

Unit – V	**8 Hours**
Management of Storage Network: System Management, Requirement of management System, Support by Management System, Management Interface, Standardized Mechanisms, Property Mechanisms, In-band Management, Use of SNMP, CIM and WBEM, Storage Management Initiative Specification(SMI-S), CMIP and DMI, Optional Aspects of the Management of Storage Networks, Summary	
Self learning topics:	

Books	
	Text Books:
1.	Storage Networks Explained Ulf Troppens, Rainer Erkens and Wolfgang Muller Wiley India 2013
	Reference Books:
1.	Storage Networks the Complete Reference Robert Spalding Tata McGraw- Hill 2011.
2.	Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems Marc Farley Cisco Press, 2005
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	
2.	

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)				
Learning Levels: **Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**				
At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	Identify the need for performance evaluation and the metrics used for it	L4	1,2,3	1,3
2.	Apply the techniques used for data maintenance.	L3	1,2	1,2
3.	Realize strong virtualization concepts	L4	1,3	1,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
OBA- Open Book Assignment **Minimum score to be eligible for SEE: 50 OUT OF 100**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔	✔	✔	✔		✔
2	✔	✔		✔	✔	
3	✔		✔	✔		✔
Tick mark the CO, PO and PSO mapping						

NATURAL LANGUAGE PROCESSING AND TEXT MINING					
Course Code	**22SCS242**	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course Objectives:

1. Learn the techniques in natural language processing.
2. Familiar with the natural language generation.
3. Be exposed to Text Mining.
4. Analyze the information retrieval techniques

Prerequisite: Database Management Systems

Unit – I	**8 Hours**
OVERVIEW AND LANGUAGE MODELING: Overview: Origins and challenges of NLP Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model.	

Unit – II	**8 Hours**
WORD LEVEL AND SYNTACTIC ANALYSIS: Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context free Grammar-Constituency- Parsing-Probabilistic Parsing.	

Unit – III	**8 Hours**

Extracting Relations from Text: From Word Sequences to Dependency Paths: Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles: Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations. A Case Study in Natural Language Based Web Search: InFact SystemOverview, The GlobalSecurity.org Experience.

Unit – IV-	**8 Hours**
Evaluating Self-Explanations in iSTART: Word Matching, Latent Semantic Analysis, and Topic Models: Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems, Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures: Introduction, Cohesion, Coh-Metrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments. Automatic Document Separation: A Combination of Probabilistic Classification and Finite- State Sequence Modeling: Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective TextMining.	

Unit –V	**8 Hours**
INFORMATION RETRIEVAL AND LEXICAL RESOURCES: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net- Stemmers-POS Tagger- Research Corpora.security	

Text Books

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
2. Anne Kao and Stephen R. Poteet (Eds), "Natural LanguageProcessingandTextMining",SpringerVerlag London Limited 2007.

References

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: Anintroduction to Natural Language Processing, Computational Linguistics and SpeechRecognition", 2nd Edition, Prentice Hall, 2008.
2. James Allen, "Natural Language Understanding", 2nd edition, Benjamin/Cummingspublishingcompany, 1995.
3. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.
4. Steven Bird, Ewan Klein, Edward Loper, "Natural Language Processing with Python," Publisher: O'Reilly Media, June 2009
5. Christopher D.Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

Course delivery methods	**Assessment methods**

1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	Analyze the natural language text	L4	1,2,3	1,2,3
2.	Generate the natural language.	L2	1	1
3.	Demonstrate Text mining	L2	1,3	1,3
4.	Apply information retrieval techniques	L4	1,2,3	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100

OBA- Open Book Assignment

Minimum score to be eligible for SEE: 50 OUT OF 100

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				CO-PSO Mapping(Planned)		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔	✔	✔	✔	✔	✔
2	✔			✔		
3	✔		✔	✔		✔

4	✔	✔	✔	✔	✔	✔
Tick mark the CO, PO and PSO mapping						

Advances in Operating System					
Course Code	22SCS243	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course learning objectives	
1.	Introduce the fundamentals of Operating System.
2.	Present the concepts of distributed operating system that includes Architecture, Mutual Exclusion Algorithms, Deadlock Detection Algorithms and Agreement Protocols.
3.	Discuss distributed resource management components including algorithms for implementation of distributed shared memory, recovery and commit protocols.
4.	Identify the components and management aspects of Real time, Mobile operating Systems.

Pre-requisites: Computer Concepts & Programming, Computer Organization.

Unit – I	**8 Hours**
Operating System Overview, Process description & Control: Operating System Objectives and Functions, Major Achievements, Developments Leading to Modern Operating Systems, Microsoft Windows Overview, Traditional UNIX Systems, Modern UNIX Systems, What is a Process?, Process States, Process Description, Process Control, Execution of the Operating System, Security Issues.	

Unit – II	**8 Hours**
Threads, SMP, and Microkernel, Virtual Memory: Processes and Threads, Symmetric Multiprocessing (SMP), Micro Kernels, Windows Vista Thread and SMP Hours Management, Linux Process and Thread Management. Hardware and Control Structures, Operating System Software, UNIX Memory Management.	

Unit – III	8 Hours
Multiprocessor and Real-Time Scheduling: Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX PreclsSl Scheduling, Windows Vista Hours Scheduling, Process Migration, Distributed Global States, Distributed Mutual Exclusion.	

Unit – IV	8 Hours
Embedded Operating Systems: Embedded Systems, Characteristics of Embedded Operating Systems, eCOS, TinyOS, Computer Security Concepts, Threats, Attacks, and Assets, Intruders.	

Unit – V	8 Hours
Kernel Organization: Using Kernel Services, Daemons, Starting the Kernel, Control in the Machine , Modules and Device Management, MODULE Organization, MODULE Installation and Removal, Process and Resource Management, Running Process Manager, Creating a new Task , IPC and Synchronization, The Scheduler , Memory Manager , The Virtual Address Space, The Page Fault Handler , File Management. The windows NT/2000/XP kernel: Introduction, The NT kernel, Objects , Threads, Multiplication Synchronization, Traps, Interrupts and Exceptions, The NT executive , Object Manager, Process and Thread Manager , Virtual Memory Manager, I/o Manager.	

Self Study Topics	
Unit No.	**Topic description**
1	The Evolution of Operating Systems.
2	Windows Vista Memory Management, Summary.
3	Distributed Deadlock.
4	Malicious Software Overview, Viruses, Worms, and Bots, Rootkits.
5	The cache Manager Kernel local procedure calls and IPC, The native API, subsystems.

Books	
	Text Books:
1.	William Stallings: Operating Systems: Internals and Design Principles, 6th Edition, Prentice Hall, 2013.
2.	Gary Nutt: Operating Systems, 3rd Edition, Pearson, 2014.
	Reference Books:
1.	Silberschatz, Galvin, Gagne: Operating System Concepts, 8th Edition, Wiley, 2008
2.	Andrew S. Tanenbaum, Albert S. Woodhull: Operating Systems, Design and Implementation, 3rd Edition, Prentice Hall, 2006.
3.	Pradeep K Sinha: Distribute Operating Systems, Concept and Design, PHI, 2007.
	E-resourses (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://nptel.ac.in/courses/106/106/106106144/
2.	https://www.cse.iitb.ac.in/~mythili/os/

Course delivery methods	Assessment methods

1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create

At the end of the course, the student will be able to		Learning Level	PO(s)	PSO(s)
1.	Demonstrate the Mutual Exclusion, Deadlock Detection and Agreement Protocols of Distributed Operating System.	L3	1,3	1,3
2.	Explain the various resource management techniques for distributed systems.	L2	1	1
3.	Identify the different features of real time and mobile operating system.	L4	1,3	1,3
4.	Modify existing open source kernels in terms of functionality or features used.	L4	1,2,3	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100

OBA- Open Book Assignment

Minimum score to be eligible for SEE: 50 OUT OF 100

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)	CO-PSO Mapping(Planned)

CO	PO1	PO2	PO3	PSO1	PSO2	PSO3
1	✔		✔	✔		✔
2	✔			✔		
3	✔	✔		✔		✔
4	✔	✔	✔	✔	✔	✔
Tick mark the CO, PO and PSO mapping						

MOBILE AND PERVASIVE COMPUTING

Course Code	22SCS244	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course Objectives:

1. To introduce the fundamental concepts of wireless networks such as Blue tooth, WIFI, WiMax, WATM and to appreciate the architectural design considerations of mobile computing environment.
2. To familiarize with the concepts of location management, mobility management and tracking management, I Cellular networks.
3. To appreciate principles of Pervasive computing and their applications.
4. To appreciate the use of mobile computing applications based on the paradigm of context aware computing.

Pre-requisite: Introductory course on mobile computing

Unit – I	**8 Hours**
Wireless networks-emerging technologies-Blue tooth, Wi-Fi, Wi-MAX, 3G, WATM, Mobile IP protocols -WAP push architecture-WML scripts and applications	

Unit – II	**8 Hours**

Mobile computing environment—functions-architecture-design considerations content architecture -CC/PP exchange protocol, context manager. Data management in WAE-Coda file system-caching schemes-Mobility QoS. Security in mobile computing

Unit – III	**8 Hours**
Handoff in wireless mobile networks-reference model-handoff schemes. Location management in cellular networks -Mobility models-location and tracking management schemes-time, movement, profile and distance based update strategies. Alternative Technologies	

Unit – IV	**8 Hours**
Pervasive Computing-Principles, Characteristics-interaction transparency, context aware, automated experience capture. Architecture for pervasive computing-Pervasive devices-embedded controls.-smart sensors and actuators -Context communication and access services	

Unit –V	**Contact Hours = 8 Hours**
Open protocols-Service discovery technologies-SDP, Jini, SLP, UpnP protocols–data synchronization- Sync ML framework -Context aware mobile services -Context aware sensor networks, addressing and communications. Context aware security	

Text Books

1. Ivan Stojmenovic , Handbook of Wireless Networks and Mobile Computing, John Wiley & sons Inc, Canada, 2002.
2. Asoke K Taukder,Roopa R Yavagal,Mobile Computing, Tata McGraw Hill Pub Co. , New Delhi, 2005.

References

1. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.
2. Uwe Hansmann et al, Pervasive Computing, Springer, New York, 2001

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in	4.	Semester End Examination

	Labs		
5.	Virtual Labs (if present)		

Course Outcome (COs) **Learning Levels:** **Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**				
At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	Explain the working of different wireless networks.	L2	1,3	1,3
2.	Develop WML scripts for various WAP architectures.	L3	1	1
3.	Explain the performance of different mobile computing architectures	L2	1	1,2
4.	Distinguish between working of mobile and Cellular device networks w.r.t location, mobility and tracking performance parameters	L4	1,2.3	1,2,3
5.	Explain the principles and characteristics of Pervasive computing devices in the context of communication and access service parameters	L2	2,3	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
OBA- Open Book Assignment **Minimum score to be eligible for SEE: 50 OUT OF 100**					

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass:** Score should be $\geq$ 40%, however overall score of CIE + SEE should be $\geq$ 50%.
3.	Question paper contains 3 parts - A,B & C, wherein students have to answer any 5 out of 7 questions in part A, 5 out of 10 questions choosing 1 question from each unit in part B & 1 out of 2 questions in part C.

CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔		✔	✔		✔
2	✔			✔		
3	✔			✔		✔

4	✔	✔	✔	✔	✔	✔
5		✔	✔	✔	✔	✔
Tick mark the CO, PO and PSO mapping						

Cloud Security

Course Code	2SCS245	**Course type**	PEC	**Credits L-T-P**	2 – 1 – 0
Hours/week: L-T-P	2 – 2 – 0			**Total credits**	3
Total Contact Hours	L = 30Hrs; T = 10Hrs;P = 00Hrs Total = 40Hrs			**CIE Marks**	100
Flipped Classes content				**SEE Marks**	100

Course Learning Objectives:

1. To understand the importance and fundamentals of Cloud Security.
2. To acquire knowledge on risk issues and legal aspects of cloud computing.
3. To understand various data security techniques.
4. To design a cloud security framework for efficient and secure operations.

Prerequisite: Cloud Computing.

UNIT I **8 Hours**

Introduction to cloud computing and security : Understanding cloud computing, The IT foundation for cloud, The bottom line, Historical view: roots of cloud computing, A brief primer on security: from 50000 ft, a brief primer on architecture, Cloud is driving broad changes, Summary. **Cloud computing architecture:** Cloudreference architecture, Control over security in cloud model, Making sense of cloud deployment, Making sense of service models, How clouds are formed and key examples, Real world cloud usage scenarios, Summary.

UNIT II **8 Hours**

Security concerns, Risk issues and Legal aspects: Cloud computing: security concerns, Assessing your risk tolerance in cloud computing, Legal and regulatory issues.**Securing the cloud: Architecture**: Security requirements for the architecture, Security patterns and architectural elements, Cloud security architecture, Planning key strategies for secure operations.
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UNIT III **8 Hours**

Securing the cloud: Data security: Overview of data security in cloud computing, Data encryption: Applications and limits, Cloud data security: Sensitive data categorization, Cloud data storage, Cloud lock-in(The Roach Motel Syndrome), Summary. **Securing the cloud: Key strategies and best practices:** Overall strategy: Effectively managing risk, Overview of security controls, the limits of security controls, Best practices, Security monitoring, Summary.

UNIT IV **8 Hours**

Security criteria: Building an internal cloud: Private clouds: Motivation and overview, Security criteria for ensuring a private cloud, Summary. **Security criteria: Selecting an external cloud provider:** Selecting a CSP: Overview of assurance, Selecting a CSP: overview of risks, Selecting a CSP : Security criteria, Summary

UNIT V **8 Hours**

Evaluating cloud security: An information: Security framework, Evaluating cloud security, Check lists for evaluating cloud security, Metrics for the check lists, Summary. **Operating a cloud:** From architecture to efficient and secure operations.

TEXT BOOK:

1. Securing the Cloud, Cloud Computer Security Techniques and Tactics, Vic (J. R) Winkler, ELSEVIER

REFERENCE BOOKS:

1. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley Publishing, Inc.

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs) **Learning Levels:** **Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**			
At the end of the course, the student will be able to	**Learning Level**	**PO(s)**	**PSO(s)**

1.	**Examine** various cloud security issues and design a security solution	L4	1,3	1,2,3
2.	**Identify** various risk issues and resolve it.**[**	L2	1	1
3.	**Explain** various data security techniques and best strategies followed to implement it.**[**	L2	1,2,3	1,3
4.	**Examine** the cloud security framework for efficient operations.**[**	L4	1,2,3	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Online Quiz	Addition of two OAs or Course Project	Course Seminar	Total Marks
Marks	25+25= 50	4* 5 marks = 20	10+10 =20	10	100
OBA- Open Book Assignment **Minimum score to be eligible for SEE: 50 OUT OF 100**					

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CO-PO Mapping (Planned)				**CO-PSO Mapping(Planned)**		
CO	**PO1**	**PO2**	**PO3**	**PSO1**	**PSO2**	**PSO3**
1	✔		✔	✔	✔	✔
2	✔			✔		
3	✔	✔	✔	✔		✔
4	✔	✔	✔	✔	✔	✔
Tick mark the CO, PO and PSO mapping						