College of Excellence, nirf 2024-7th Rank
Autonomous and Affiliated to Bharathiar University
Accredited with A++ grade by NAAC
Peelamedu, Coimbatore-641004

DEPARTMENT OF COMPUTER SCIENCE (PG)

CHOICE BASED CREDIT SYSTEM (CBCS) &

LEARNING OUTCOMES - BASED CURRICULUM FRAMEWORK (LOCF)

MASTER OF SCIENCE IN COMPUTER SCIENCE
2024 -2026 BATCH
Semester III

M.Sc. Computer Science

Programme Outcomes

After completion of the Programme, the student will be able to

PLO1: Demonstrate broad knowledge in core areas of computer science, current and emerging technologies in IT

PLO2: Apply higher degree of technical skills in problem solving and application development

PLO3: Gain analytical and managerial skills to enhance employment potential

PLO4: Acquire holistic development with strong emphasis on values and ethics

Programme Specific Outcomes

The students at the time of graduation will

PSO1: Identify and formulate complex problems to achieve solutions using concepts of algorithms, advanced networks, database management systems, artificial intelligence and machine learning.

PSO2: Design solutions for complex problems and design processes that meet the specific needs of the society.

PSO3: Create and apply appropriate techniques, resources and tools including prediction and modeling to multifaceted activities.

PSO4: Apply programming and technical skills to solve real life complex problems and hence enhance employability.

PSO5: Analyze research methods including interpretation of data and synthesis of the information to provide valid conclusions.

PSO6: Demonstrate skills as an individual and as a member or leader in diverse teams

PSO7: Recognize the need for life-long learning and pursue career as a researcher or software engineer.

PSO8: Apply ethical principles and contribute effectively to the welfare of the society.

MASTER OF SCIENCE IN COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM(CBCS)
LEARNING OUTCOMES - BASED CURRICULUM FRAMEWORK(LOCF)
SYLLABUS & SCHEME OF EXAMINATION
2024 - 2026 Batch -Semester- III

Semester	Course Code	Title of the Course	Course Type	Instruction hours / week	Contact hours	Tutorial hours	Duration of Examination	Examination Marks			Credits
								CA	ESE	Total	
III	MCS2306	Artificial Intelligence	CC	3	43	2	3	25	75	100	3
III	MCS2409	Advanced Java Programming	CC	5	73	2	3	25	75	100	5
III	MCS2410	Cloud Computing Tools and Techniques	CC	4	58	2	3	25	75	100	4
III	MCS24E3/ MCS23E4/ MCS23E6/ MCS23E7/ MCS23E9/ MCS23E10	Deep Learning / Cyber Security and Forensics / Natural Language Processing / Social Media Analytics/ Virtual Reality/ Quantum Computing	DSE	4	58	2	3	25	75	100	4
III	MCS22S1	Research Methodology	CC	4	60	-	3	-	100	100	4
III	MCS23P5	Advanced Java `Programming Lab	CC	5	75	-	3	25	75	100	3
III	MCS23P6	Robotic Process Automation Lab	CC	5	75	-	3	25	75	100	3
IV	MCS24COM	Comprehensive Exam – Online	GC	-	-	-	-	100	-	100	Gr.
III	MCS23IST	Summer Internship	DSE	-	-	-	-	100	-	100	Gr.
III	MNM22CS2	Cyber Security II	AECC	-	-	-	-	100	-	100	Gr.
I-III	17MONL1	Online Course	ACC	-	-	-	-	-	-	-	-

*Open Book-MCS2306-Artifical Intelligence

CC - Core Course
DSE - Discipline Specific Elective
AECC - Ability Enhancement Compulsory Course
ACC – Additional Credit Course
GC - General Course

Examination System

Pattern:

Semester system will be followed. A semester consists of a minimum of 90 working days Excluding the days of conduct of ESE. There will be Continuous Internal Assessment (CA) to evaluate the performance of students in each course and the End Semester Examination will be held at the end of every semester.

Weightage assigned to various components of Continuous Internal Assessment

Theory

CIA Test	: 5 marks (conducted for 45 marks after 50 days)
Model Exam	: 7 marks (Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz	: 5 marks
Class Participation	: 5 marks
Attendance	: 3 marks
Total	**: 25** Marks

Practical Lab

Performance	: 7 marks
Regularity	: 5 marks
Model Exam	: 10 marks
Attendance	: 3 marks
Total	**: 25** marks

CA Question Paper Pattern and distribution of marks –(First 3 Unit)

Core and Elective Courses

CA question from each unit comprising of

One question with a weightage of 2 Marks :2 x 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :5 x 3=15

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :8 x 3 =24

Total :45 Marks

Cyber Security II

Quiz	: 60 marks
Case study	: 20 marks
Poster	: 20 marks
Total	: 100 marks

End Semester Examination- Question Paper Pattern and Distribution of Marks

Core and Elective Courses

ESE Question Paper Pattern: 5 x 15 = 75 Marks

Question from each unit comprising of

One question with a weightage of 2 Marks: 2 x 5=10

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5=25

One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5 =40

Research Methodology

Section A - 5 questions (Internal choice): 25 marks

Section B - 5 questions (Internal choice): 75 marks

Total **: 100 Marks**

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Open book exam

CIA Test Pattern: 4 (4 out of 6) x 15 Marks = 60 Marks

Criteria for Attendance:

3 Marks (Attendance 75% - 80% - 1 Marks,81% - 90% - 2 Marks,91% - 100% - 3 Marks)

Course code	Course Title	Category	L	T	P	Credit
MCS2306	ARTIFICIAL INTELLIGENCE	Theory	43	2	-	3

Preamble

This course introduces the concepts of Artificial Intelligence and the various methods of solving problems using Artificial Intelligence. It also provides insights on machine learning techniques and its applications.

Prerequisite

- Probability and Statistics
- Discrete Structures

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the techniques of knowledge representation and problem solving in the field of artificial intelligence	K2
CLO2	Apply appropriate AI techniques for real time scenarios	K3
CLO3	Analyze suitable Artificial Intelligence principles to solve a given problem	K4
CLO4	Evaluate different AI algorithms appropriate for solving a given problem	K5
CLO5	Design and develop models for predictive tasks in various domains	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	S	M	M
CLO2	M	M	M	M
CLO3	M	M	M	L
CLO4	S	M	L	M
CLO5	S	S	M	M

S- Strong; M-Medium; L-Low

UNIT I (**9 hrs**)
Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth- First, DepthFirst Search, Depth-first with Iterative Deepening), **Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)**

UNIT II (**9 hrs**)
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning. Randomized Search: Genetic Algorithm - Ant Colony Optimization. **Basic Knowledge Representation and Reasoning:** Propositional Logic, First-Order Logic, **Forward Chaining and Backward Chaining**, Introduction to Probabilistic Reasoning, Bayes Theorem.

UNIT III (9 hrs)

Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem. **Using Predicate Logic:** Representing simple facts in logic – Representing Instance and Is a relationship – **Computable functions and predicates – Resolution**

UNIT IV (8 hrs)

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – **Matching – Control knowledge**

UNIT V (8 hrs)

Expert Systems: Representing and Using Domain Knowledge- Expert Knowledge Shell- Knowledge Acquisition- Perception. **Case Studies:** AI in Environmental Management (Smart Pollution Control, Water Management, Farming) - AI in Retail (Alibaba, Walmart) - **AI in Medical Imaging (MRI, US, Mammography)**

Text Books .

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Stuart Russell, Peter Norvig,	Artificial Intelligence: A Modern Approach	Pearson Publishing	2020,4th Edn
2.	Lavika Goel	Artificial intelligence: Concepts and applications	Wiley Publications	2021,1st Edn

Reference Books .

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	G. Luger	Artificial Intelligence: Structures and Strategies for complex problem solving	Pearson Publishing	2021,4th Edn

Pedagogy: Lectures, Demonstrations, Case Studies

Course Designer:

Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS2409	**ADVANCED JAVA PROGRAMMING**	**III**	**73**	**2**	**-**	**5**

Preamble

This course presents concepts to design and develop web-based applications using Servlets and Web Sockets. It also covers concepts such as Java Persistence API, EJB, JSF, Hibernate, Spring and Struts framework.

Prerequisite

• Java
• HTML

Course Learning Outcomes

On completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1.	Understand the basic concepts of web designing	K2
CLO2.	Determine the importance of scripting language in making a web page interactive	K3
CLO3.	Examine the utilization of Servlets, EJB, JSF and Hibernate in the development of dynamic web applications	K4
CLO4.	Design web-based applications using Spring, Struts and Java Persistence API	K5
CLO5.	Develop modern Web Applications using the client and server-side technologies	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	S	S	M
CLO2	S	S	M	L
CLO3	S	M	M	M
CLO4	S	M	L	M
CLO5	S	M	M	L

S- Strong; M-Medium; L-Low

UNIT I (15 Hrs)

Java Servlets: Java Servlets and Common Gateway Interface Programming – A Simple Java Servlet – Anatomy of a Java Servlet – Reading data from a client – Reading HTTP Request Headers –Sending Data to a Client and Writing the HTTP Response Header – **Working with Cookies – Tracking Sessions.**

Java Server Pages (JSP): Introduction to JSP- JSP architecture and lifecycle - JSP scripting elements and directives - **JSP standard actions and custom tags-Expression Language.**

Model-View-Controller (MVC): Fundamental Concepts and Components - **Integration with Servlets and JSP for Web Application Development.**

UNIT II (15 Hrs)

Java Server Faces (JSF): JSF Request Processing Lifecycle - JSF Expression Language (EL) - PrimeFaces Library Usage in JSF Applications -JSF Libraries- **JSF Event Handling- Standard Component Tags and Facelets**.

Enterprise Java Beans (EJB): Introduction to EJB: Benefits and Types - Lifecycle of Stateful and Stateless Session Beans - Message-Driven Beans: Configuration, Features, and Applications - **Client Access Interfaces: Remote and Local Access - Container-Managed Relationships.**

Java Database Connectivity (JDBC): Establishing Connections, Executing SQL Queries - Transaction Management - **ResultSet and Metadata Processing.**

UNIT III (15 Hrs)

Spring Core: IoC Container and Dependency Injection (DI) - Spring Configuration and Spring Boot Setup **- Bean Lifecycle and Configuration.**

Spring MVC: Dispatcher Servlet Architecture - Annotations and Controllers - Views and Input Validation - **File Upload Handling.**

Spring REST API: Building and Consuming RESTful Web Services - HTTP Methods (GET, POST, PUT, DELETE) - **Exception Handling in REST API.**

UNIT IV   **(14 Hrs)**
Spring ORM with Hibernate: Entity Relationships (One-to-One, One-to-Many, Many-to-Many) - Embeddable Collection Types – Inheritance – Persistence Context & Entity Manager – JPQL and Criteria API – Spring Data JPA **– Spring Data JPA Specification & Projection** - Integrating Spring ORM with Hibernate.
Spring AOP: Aspect-Oriented Programming Concepts - **Implementing Cross-Cutting Concerns like Logging and Security** - Join Points and Pointcuts.
Spring Cloud: Microservices Architecture - Service Discovery (Eureka) - Centralized Configuration (Config Server) - **Fault Tolerance and Load Balancing with Hystrix and Ribbon.**

UNIT V   **(14 Hrs)**
STRUTS FRAMEWORK: Introduction to Struts – Two Development Models – Model View Architecture – Enter struts – Basic Components of Struts – Building Simple Struts Application – Model Layer: Struts and the model - **View Layer: Struts and view layer -The Controller Layer: Struts and controller layer.**

TEXT BOOKS

S.No	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1	David Flanagan	JavaScript: The Definitive Guide	O'Reilly Media	2020 / 7th Edn
2	Matt Frisbie	Professional JavaScript for Web Developers	Wiley Publishing	2019 / 4th Edn
3	David R. Heffelfinger	Java EE 8 Application Development	Packt Publishing	2017 / 1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1	Iuliana Cosmina et al.	Pro Spring 5	Apress	2017 / 5th Edn
2	Jim Keogh	The Complete Reference J2EE	McGraw Hill Education	2017 / 1st Edn
3	Giulio Zambon	Beginning JSP, JSF and Tomcat	Apress	2022 / 1st Edn
4	Santosh Kumar K	JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns	Dream Tech	2016 / 2nd Edn

Pedagogy: Lectures, Demonstrations, Case Studies

Course Designers:
Dr.R.Kowsalya
Mrs.A.Sheela Rini

Course Code	Course Title	Category	L	T	P	Credit
MCS2410	**CLOUD COMPUTING TOOLS AND TECHNIQUES**	Theory	58	2	-	4

Preamble

This course begins with an introduction to cloud computing, covering service and deployment models, virtualization technologies, and the benefits of cloud-based solutions. It further explores scalability strategies, autoscaling mechanisms, and collaborative development in cloud-native environments.

Prerequisite

- Computer Network
- Fundamentals of Operating Systems

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Explain the fundamental concepts of cloud computing, including service and deployment models, characteristics, benefits, and cloud-native principles.	K2
CLO2	Demonstrate the ability to use virtualization techniques, autoscaling strategies, and collaborative development in cloud-native environments.	K3
CLO3	Analyze resource management issues and security challenges in cloud computing and propose effective solutions.	K4
CLO4	Evaluate open-source cloud-native DevOps tools, infrastructure as code (IaC) management, and the impact of AI and security compliance in cloud environments.	K5
CLO5	Design and develop cloud-based solutions using cloud computing development tools, cloud simulators, and modern cloud-native frameworks.	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	S	S	S
CLO2	S	S	S	S
CLO3	S	S	S	M
CLO4	S	S	M	M
CLO5	S	S	M	L

S-Strong; M-Medium; L-Low

UNIT I (11 hrs)

Introduction: Cloud Computing – Service Delivery Models-Deployment Models - Characteristics and

Benefits of Cloud Computing - Cloud Computing Platforms and Technologies. Cloud Native: Continuous Integration and Delivery - **Serverless Computing - Advantages of Serverless Cloud Computing**-Popular Serverless Computing Platforms-Disadvantages of Serverless Cloud Computing
Virtualization: Virtualization **Technology-** Virtualization Platforms – Virtualization Techniques-Pros and Cons of Virtualization.

UNIT II   **(12 hrs)**
Scalability and Autoscaling Strategies: Scaling Principles in Cloud-Native Applications-Multi-Cloud Strategies-Autoscaling Implementation in AWS-**Future Trends in Scalability and Autoscaling.**
Collaborative Development in the Cloud Native: Optimizing Cloud-Based Data Flow-ETL Processes and Supply Chain Management.

UNIT III   **(11 hrs)**
Resource Management in Cloud: Significant Resource in Cloud-Issues in Resource Mangement-**Solutions to Resource Management Issues.Cloud Security:** Data Security-Encryption Techniques in Cloud-Infrastructure Security-PaaS Application Security-SaaS Application Security- **Securing Virtual Servers**-Cloud Security Controls

UNIT IV   **(12 hrs)**
Open-Source Tools for Cloud-Native Devops: Overview of Open-Source Tools in Cloud Native-Argo Streamlining Workflows-Kubeflow Pipelines-Future Trends in Cloud-Native Devops Tools-Adoption of Cloud-**Native Technologies-Infrastructure as Code (IaC) Management**-Artificial Intelligence Evolution-Security and Compliance-Collaboration between DevOps Teams-Fresh Dimension in Quantum Computing-Adapting to Change-Artificial Intelligence for IT Operations (AIOps)

UNIT V   **(12 hrs)**
Cloud Computing Development Tools: Kernel Virtual Machine (KVM)-DeltaCloud-Eucalyptus-OpenStack-SaltStack-Apache CloudStack-**AWS Cloud Development Kit (AWS CDK)**-Windows Azure SDK **Cloud Simulators**- CloudSim and GreenCloud Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture (User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, **Introduction to Green Cloud**

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Dr.Sunilkumar Manvi, Dr.Gopal K.Shyam	Cloud Computing Concepts and Technologies	CRC Press, Taylor and Francis Group, New York	2025 / 1st Edn
2.	Mohammed Iiyas Ahmed	Cloud-Native DevOps	Apress	2025 / 1st Edn
3.	K.Chandrasekaran	Essentials of Cloud Computing	CRC Press, Taylor and Francis Group, New York	2023 / 1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Anthony T.Velte , Toby J. Velte Robert Elsenpeter	Cloud computing a practical approach	TATA McGraw-Hill, New Delhi	2017 / 2nd Edn
2.	Edited by Rajkumar Buyya, James Broberg,	Cloud Computing (Principles and Paradigms)	John Wiley & Sons, Inc.	2013 / 3rd Edn

	Andrzej Goscinski			

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers:
Dr.R.Kowsalya
Dr.T.Thendral

Course Code	Course Title	Category	L	T	P	Credits
MCS22S1	**RESEARCH METHODOLOGY**	**Theory**	**60**	**-**	**-**	**4**

Preamble

This course presents the concepts of research, types of research, research design, literature review and writing reports. It also covers various areas of computer science.

Prerequisite

This course is most appropriate for postgraduate students who are interested in research but do not have prior research experience.

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of research design, research process and various types of research	K2
CLO2	Apply the research methodologies in different research areas	K3
CLO3	Analyze the ethical issues in research	K4
CLO4	Evaluate the methods and techniques for various experimental study	K5
CLO5	Develop solutions for research problems in a responsible and ethical manner	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	M	M
CLO2	S	L	M	M
CLO3	S	S	S	L
CLO4	S	M	S	S
CLO5	S	S	S	S

S- Strong; M-Medium; L-Low

UNIT I (12 Hrs)
Research Methodology: An Introduction: Meaning of research - Objective of research -Types of research - Significance of research -Research methods versus Methodology - Research and scientific method - Research process - Criteria of good research -**Problems encountered by researchers in India**. **Defining the research problem:** What is a research problem? - Selecting the problem - Necessity of defining the problem - **Technique involved in defining a problem**

UNIT II (12 Hrs)
Reviewing the literature: Literature review in research - How to review the research? - **Writing about the literature reviewed** - **Formulating a research problem**. **Research Design:** Research Design: Meaning of research design - Need for research design - Features of a good design - **Important concepts relating to research design** - **Different research designs** - Basic principles of experimental designs

UNIT III (12 Hrs)
Data Collection: Introduction - Experiments and Surveys - Collection of primary data - Collection of secondary data - **Selection of appropriate method for data collection** - Case study method. **Data Preparation:** Data Preparation Process - Some problems in preparation process- **Missing values and outliers** -Types of analysis - Statistics in research

UNIT IV (12 Hrs)
Interpretation and report writing: Meaning of interpretation - Technique of interpretation -Precaution in interpretation - Significance of report writing - Different steps in writing report - Layout of the research report - Types of reports - Oral Presentation - Mechanics of writing a research report - Precautions for writing research reports

Research Publications: Preparing Research papers for journals, Seminars and Conferences – Design of paper using template, Plagiarism, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN, IPR, Patent.

UNIT V (12 Hrs)
Research Ethics and Responsible Conduct in Research: Brief history and analytical basis of research ethics, responsible conduct in research (Honesty in Science: Integrity, Authorship, Conflicts of Interest, Privacy and Confidentiality, Informed Consent, Risk/Benefit Assessment), The legal regulation of research ethics in India (From UGC, MHRD and other governing agencies), Regulatory requirements relevant to international research.

TEXT BOOKS				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR OF PUBLICATION /EDITION
1.	Kothari, GauravGarg	Research Methodology-Methods and Techniques	New Age International Publishers	2021,4th Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS	YEAR OF PUBLICATION /EDITION
1.	RanjitKumar	Research Methodology A step-by-step guide for beginners	Pearson Education	2015,3rd Edn

Pedagogy: Lectures, Demonstration, Case Studies

Course Designer:

Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS23P5	**ADVANCED JAVA PROGRAMMING LAB**	**III**	**-**	**-**	**75**	**3**

Preamble

This course provides exercises to design and develop web-based applications using MVC concepts. It also provides exercises to implement Spring, Java Persistence API, Hibernate and Struts concepts to create an interactive application.

Prerequisite

    •Java

    •HTML

Course Learning Outcomes

On completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the method of compiling and running web-based applications	K2
CLO2	Implement database connectivity techniques to connect application with the database	K3
CLO3	Analyze the importance of web services in making a webpage interoperable	K4
CLO4	Design web-based applications using Spring and Java Persistence API	K5
CLO5	Develop modern Web Applications using the client and server-side technologies	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	S	M	S
CLO2	M	S	M	S
CLO3	M	S	M	S
CLO4	M	S	M	S
CLO5	S	S	M	S

S- Strong; M-Medium

Syllabus

- •Exercise to implement web sockets.
- •Exercise to implement form validation techniques.
- •Exercise to implement file upload.
- •Exercise to implement exception handling.
- •Exercise to inject date into spring bean property.
- •Exercise to develop a servlet application.
- •Exercise to implement dependency injection in spring.
- •Exercise to implement JPA and Hibernate.
- •Exercise to design a web application using struts.

Pedagogy: Demonstration**s**
List of Programs
Application :

1. Develop a product-based web application using struts.
2. Develop a Java Spring program to raise exceptions for invalid bank transactions.
3. Create an application for employee details using Hibernate.
4. Develop a student internship JSP application to display values obtained from the use of intrinsic objects of various types.
5. Develop a Employee age and hobbies application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender-radio button) using JSP.
6. Test RESTFUL Webservices Using Spring Boot.
7. Develop a Parents details using struts and store datas and retrieve using Rabbit Message Queue.
8. Develop a student's admission basic registration form using JSF along email validation.
9. Develop an JSF application with a prime faces data tables, fetching product details from a database and enable the sorting, filtering and pagination.
10. Create an application for patient appointment details using Hibernate.
11. Develop to store the alumni details-based web application using struts.

12. Develop an online feedback system using struts.

13. Develop a Employee registration form as a web-based application using Spring Django framework.

Pedagogy: Demonstration**s**

Course Designers:
Dr.R.Kowsalya
Mrs.Sheela Rini

Course Code	Course Title	Category	L	T	P	Credit
MCS23P6	**ROBOTIC PROCESS AUTOMATION LAB**	Practical	-	-	75	3

Preamble

This course provides an understanding of basic concepts of Robotic Process Automation and also various exercises to implement RPA Design and Development strategies in the context of UiPath. This course also develops the competence to design and develop a robot for a defined process

Prerequisite

Basic Programming Concepts

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand Ui-Path Studio	K2
CLO2	Apply simple RPA basics	K3
CLO3	Analyse arithmetic operations for different fields from an excel file	K4
CLO4	Evaluate different formats for input and output validations	K5
CLO5	Develop bots for real time automation applications	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	L	M	M
CLO2	S	S	M	M
CLO3	S	S	M	L
CLO4	S	S	S	M
CLO5	S	S	S	M

S- Strong, M-Medium, L-Low

Syllabus

- Exercises to implement basics of RPA (Variables, Arguments, Control Flow. etc)
- Exercises to empty the trash folder in Gmail and recycle Bin
- Exercises to implement loops. (if, switch, while, do-while, for loop, etc.)
- Exercise to implement static and Dynamic table
- Exercise to implement separate workflow and arguments
- Exercise to implement clipboard management
- Exercise to perform operations on excel file (Read cell, Write Cell, arithmetic operations. Etc.,)
- Exercise to implement controls using mouse and keyboard activities

- Develop simple bots. (data transfer from on system to another, Email Automation, Password Generator, Generating mass emails etc.,)

Pedagogy: Demonstrations

List of Exercises:

1. Design Read and Replace a text in word document using UiPath.
2. Design a bot that automates the on boarding process for new employees.
3. Create a Screen scraping using UiPath.
4. Demonstrate Data manipulation using Contains method in UiPath.
5. Implement sorting in the list with manipulation of data using UiPath.
6. Demonstrate Exception handling in UiPath.
7. Design a Bot for clipboard management.
8. Demonstrate the invoke method activity to perform operations in UiPath
9. Design a process to secure the text from the user, using keyboard activities in UiPath

Applications
1. Create a UiPath Orchestrator process to configure the process settings, adding robots, and defining schedules to run the robots.
2. Build a bot that assists customer support agents by fetching relevant information from databases or knowledge bases.
3. Design Captcha Automation in UiPath.
4. Develop simple bots (data transfer from one system to another, Password Generator and Generating mass emails).
5. Design a simple Bot for reading Email using Ui Path.
6. Develop a bot that extracts data from a webpage and saves it into a structured format such as Excel.
7. Develop a Bot to find movie rating.
8. Design a Bot to create and deliver the invoice.

Pedagogy: Demonstrations

Course Designer:
Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credits
MCS24E3	**DEEP LEARNING**	**Theory**	**58**	**2**	**-**	**4**

Preamble

This course covers the context of deep learning, know how to use a neural network, understand the data needs of deep learning, have a working knowledge of deep learning, and explore the parameters for deep learning

Prerequisite

- Artificial Intelligence
- Machine Learning

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basics of deep learning	**K2**
CLO2	Apply the concept of optimization and generalization in deep learning.	**K3**
CLO3	Explore the deep learning applications.	**K4**
CLO4	Evaluate the analysis of algorithm efficiency using different notations.	**K5**
CLO5	Implement various deep learning models.	**K6**

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	S	S
CLO2	S	S	S	M
CLO3	S	S	M	S
CLO4	L	M	S	S
CLO5	S	M	L	M

S- Strong; M-Medium; L-Low

UNIT I (11 Hrs)

Introduction to Deep Learning: Gradient-Based Learning - Architecture Design - Optimization for Training Deep Models: Learning Differs from Pure Optimization, Challenges in Neural Network Introduction to Neural Networks - Training a network: loss functions, back propagation and stochastic gradient descent- **Neural networks as universal function approximate.**

UNIT II (11 Hrs)

Deep Learning Probabilistic Approach: Random Variables - Probability Distributions - Marginal Probability - Conditional Probability - **A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization**- What a shallow network computes - VC Dimension and Neural Nets-Deep Vs Shallow Networks, Convolution Networks- The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Semi-supervised Learning.

UNIT III (12 Hrs)

Linear (PCA, LDA) and manifolds, metric learning: Probabilistic PCA and Factor Analysis, Independent Component Analysis (ICA), Slow Feature Analysis, Manifold Interpretation of PCA, Auto encoders and dimensional reduction in networks - Introduction to Convent - Architectures – Alex Net, VGG, Inception, Res Net - **Training a Convent: weights initialization, batch normalization, hyper parameter optimization.**

UNIT IV (12 Hrs)

Optimization in deep learning: Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - **Recurrent Neural Network Language Models**- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

UNIT V (12 Hrs)

Images segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative adversarial networks – Video to Text with LSTM models – Attention models for Computer Vision. Applications of Deep Learning: Social media filters, Drowsy driver detection, Fake currency detection, Sign language recognition, Breast cancer detection, Emotion and gesture recognition, Enhanced Night Vision System Case Study: **Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.**

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Ian Goodfellow, Yoshua Bengio, Aaron Courville	Deep Learning	MIT Press	2017 / 1st Edn
2.	Christopher M. Bishop, Hugh Bishop	Deep Learning: Foundations and Concepts	Springer Nature	2023 / 1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Simon J. D. Prince Book preview	Understanding Deep Learning	MIT Press	2023 / 1st Edn
2.	Francois Chollet	Deep Learning with Python	Manning Publications	2018 / 2nd Edn
3.	Phil Kim	Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence	Apress	2017 / 3rd Edn

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers:
Dr.R.Kowsalya
Dr.S.Lakshmi Priya

Course Code	Course Title	Category	L	T	P	Credits
MCS23E4	**CYBER SECURITY AND FORENSICS**	Theory	58	2	-	4

Preamble

This course covers the fundamental techniques of security aspects like threats, attacks and authentication procedures. It also presents effective security systems and investigates security incidents.

Prerequisite

- Computer Security

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of various security aspects like threats, attacks and authentication procedures	**K2**
CLO2	Apply various type security attacks by inspecting their characteristics.	**K3**
CLO3	Analyze security issues in network and computer systems	**K4**
CLO4	Evaluate and communicate the human role in security systems	**K5**
CLO5	Interpret and forensically investigate security incidents	**K6**

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	S	S
CLO2	S	S	S	M
CLO3	S	S	L	S
CLO4	M	S	S	S
CLO5	S	S	M	L

S- Strong; M-Medium; L-Low

UNIT I (11 Hrs)

Introduction to Cybercrime: Cybercrime and Information Security - Classifications of Cybercrimes – Legal Perspectives of Cybercrimes - Indian Perspectives of Cybercrimes –Cybercrime and the Indian ITA 2000 – Global Perspective on Cybercrimes. Cyber offenses: Categories of Cybercrime – **How Criminal Plan the Attacks** – **Social Engineering** – **Cyberstalking** – **Cybercafé and cybercrimes- Botnets**.

UNIT II (11 Hrs)

Cybercrime in Mobile and Wireless Devices: Introduction – proliferation of Mobile and Wireless Devices – Trends in mobility – C**redit card Frauds in Mobile and Wireless Computing Era** – Security Challenges posed by Mobile Devices – Registry settings for Mobile Devices –Authentication Service

Security – **Attacks on Mobile/Cell Phones** – Mobile Devices Security Implications for Organizations – Organizational Measures for Handling Mobile Devices – Organizational Security Policies and Measures in Mobile Computing Era. Phishing and Identity Theft: – Introduction – Phishing – **Identity Theft.**

UNIT III   (12 Hrs)

Cyber Crime and Cyber Laws: Cybercrime and the legal landscape around the World – Need for Cyber Laws – Indian IT Act – **Challenges in Indian law and Cybercrime Scenario in India – Consequences of Not Addressing the weakness in IT Act** - Digital Signatures and the Indian IT Act – Amendments to the Indian IT Act – Cybercrime and Punishment.

UNIT IV   (12 Hrs)

Understanding Computer Forensics: Historical Background – Need for Computer Forensics – Cyber forensics and Digital Evidence – Forensics Analysis of Email – Digital Forensics Life Cycle- Chain of Custody Concept – Network forensics – Approaching a Computer Forensics Investigation – **Forensics and Social Networking Sites** – **Computer forensics from Compliance perspectives- Challenges in Computer Forensics.**

UNIT V   (12 Hrs)

Digital Forensics: Overview - Preparing for Digital Investigations – Maintaining Professional Conduct – Preparing a Digital Forensics Investigation – Procedures for Private Sector High Tech Investigations – **Understanding Data Recovery Workstations and Software – Conducting an Investigation.** Data Acquisition: Understanding Storage Formats for Digital Evidence – Determining the Best Acquisition Method – Contingency planning for Image Acquisitions - Using Acquisition Tools – **Validating Data Acquisitions – Using Other Forensics Acquisitions Tools.**

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Bill Nelson, Amelia Phillips and Christopher Steuart	Guide to Computer Forensics and Investigations	Cengage	2019 / 6th Edn
2.	Nina Godbole and SunitBela pore	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Wiley Publications	2011 / 4th Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Harlan Carvey	Windows Forensic Analysis Toolkit	Syngress	2012 / 4th Edn

Pedagogy: Lectures, Group Discussions, Case studies

Course Designer:
Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credits
MCS23E6	**NATURAL LANGUAGE PROCESSING**	**Theory**	**58**	**2**	**-**	**4**

Preamble

This course introduces the methods in Natural Language Processing (NLP). This course includes the various algorithms used in NLP. This course also covers various NLP tools and techniques

Prerequisite

- Data mining concepts
- Machine Learning Concepts

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of NLP in handling text data	**K2**
CLO2	Apply NLP analytical techniques on real time text data	**K3**
CLO3	Analyze text data with appropriate NLP algorithms and techniques.	**K4**
CLO4	Evaluate different NLP algorithms for handling and optimizing text data	**K5**
CLO5	Design and develop models for accomplishing NLP task	**K6**

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	S	M	L
CLO2	S	S	L	M
CLO3	S	S	S	S
CLO4	S	M	S	S
CLO5	S	L	S	S

S- Strong; M-Medium; L-Low

UNIT I (11 Hrs)

Introduction to NLP - Regular Expressions – **Words – Corpora** – Text Normalization – N-gram Language Models – N-Grams – Evaluating Language Models – Smoothing – Naïve Bayes Classifiers Training the NB Classifier – **Worked example**.

UNIT II (11 Hrs)

Logistic Regression: Learning in Logistic Regression – The cross-entropy loss function – Gradient Descent – **Regularization** - Vector semantics and embeddings – Lexical semantics – vector semantics - **words and vectors** – TF-IDF: weighing terms in the vector – **Word2vec** – **visualizing embeddings.**

UNIT III   (12 Hrs)
Sequence labelling for parts of speech and named entities: English word classes – parts-of-speech tagging – **named entities and named entities tagging** – Constituency Grammars: constituency – context-free grammar. Logical representation of sentence meaning – first-order logic - **event and state representation**. Information Extraction: relation extraction – extraction events and their time

UNIT IV   (12 Hrs)
Word senses and wordnet – word sense – relation between sense – **wordnet: a database of lexical relations**. Semantic role labelling – semantic roles – Frame net - **semantic role labelling** – Lexicons for Sentiment, Affect and Connotation: Defining emotion – available sentiment and affect lexicons – creating affect lexicons by human labelling.

UNIT V   (12 Hrs)
Question Answering: Information retrieval - **Knowledge based question answering - Chatbots & dialog system: properties of human conversation – chatbots.** Phonetics: Speech Sounds and Phonetic Transcription – Automatic Speech Recognition and Text-to-Speech: The automatic speech recognition task – Feature extraction for ASR: Log Mel Spectrum – Speech Recognition Architecture.

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Daniel J and James H. Martin	Speech and language processing An introduction to natural language processing, computational linguistics & speech recognition	Prentice hall Publishers	2020 / 1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Dwight Gunning, Sohom Ghosh	Natural Language Processing Fundamentals	Packt Publishers	2019 / 3rd Edn
2.	Hobson Lane, Hannes Hapke, and Cole Howard	Natural Language Processing in Action: Understanding, analyzing, and generating text with Python	Manning Publications	2019 / 4th Edn

Pedagogy: Lectures, Group Discussions, Case studies

Course Designer:
Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS23E7	**SOCIAL MEDIA ANALYTICS**	Theory	58	2	-	4

Preamble

The course covers concepts and techniques for retrieving, exploring, visualizing, and analyzing social network and social media data. Students learn the key metrics to assess social media goals, perform social network analysis to apply social media analytics processes and formulate effective strategies based on the analytics.

Prerequisite

Foundations of Data Science

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand sources and limitations of social media data.	K2
CLO2	Apply social media analytics and evaluate metrics.	K3
CLO3	Examine different social media platforms and their associated tools	K4
CLO4	Apply social media information to create dashboards and reports for visualization.	K5
CLO5	Design effective strategy based on the social media analytics data.	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	M	M
CLO2	S	S	M	M
CLO3	S	M	S	L
CLO4	S	L	S	M
CLO5	S	S	M	M

S- Strong, M-Medium, L-Low

UNIT I (11 Hrs)

Foundation for Analytics: – Digital Gap – Social Media Data Sources – Defining Social Media Data– Data Sources – Estimated vs. Factual Data Sources – Data Gathering in Social Media Analytics. **From Data to Insights:** Actionable Analytics – Focus on objective – Plan to shape data to insights – choosing a good analytics tool – Data Aggregation calculations and display – Data display – social media and its data – Potential Challenges. **Data Identification: Professional** networking sites - **social sites – formation sharing sites – micro blogging sites – blogs /wikis.**

UNIT II (12 Hrs)

Analytics in social media: Types of analytics. Dedicated Vs. Hybrid Tools – Dedicated tools – Hybrid tools – Data Integration Tools – Best Setup. **Social Network Landscape:** Concept and UX on social networks – Interactivity of social network – Content flow on social network – **Interaction Pattern**

between users –social media as a two-way channel.

UNIT III   (12 Hrs)

Analytics Process: Analysis – Insight – Investigation beyond social analytics – Shaping a method – analysis cycle – Community Activity – Resources – Attention span – Dynamic cycles – Short Periods – Long Periods – Analyst Mindset – Instinctive Analyst. **Metrics: Introduction – Default and custom metrics – Metrics Categories – Graph Types** – Metric Capabilities – Metrics and Strategy – Estimated Metrics–**Metrics and Tactics.**

UNIT IV   (12 Hrs)

Dashboards: Purpose and Objectives – Default Vs. Custom Dashboards – Linearity and order of metrics – Metrics Positioning and Correlation – Metric and dashboard layout – Graphic design – Data Integration dashboards. **Reports:** Elements of reporting – **Reporting approaches and formats – Animation and effects in reporting – Stake holders and feedback – Reporting with teams.**

UNIT V   (11 Hrs)

Strategy: Strategy in social media analytics – Strategic planning – Data availability and data sources – Knowledge beyond social media – Tools and technology preparation – Team Preparation – Goals and objectives – Contingency plans – **application of social media analytics strategy – Strategy and tactics – Evaluation of a strategic analytics cycle.**

Case Studies: Targeting the audience using Facebook Analytics, Tracking profile analytics in LinkedIn, Analysis of Political Tweets, ROI Analytics using Facebook, Marketing Strategy in Pinterest.

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Alex Goncalves	Social Media Analytics Strategy: Using Data to Optimize Business Performance	APress	2022/1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Ganis, Kohirkar	Social Media Analytics	IBM Press PTG	2016 / 4th Edn
2.	Nancy Flynn	The Social Media Hand book Policies, and Best Practices	Wiley	2012 / 3rd Edn

Pedagogy: Lectures, Demonstrations, Group Discussions, Case studies

Course Designer:
Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS23E9	VIRTUAL REALITY	Theory	58	2	-	4

Preamble

This course provides the technology behind virtual reality and introduces input, output devices used for virtual reality. It also presents the techniques and applications used for augmented reality.

Prerequisite

- Animation Techniques
- Image Processing

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of virtual reality	K2
CLO2	Apply appropriate techniques and design augmented reality applications	K3
CLO3	Analyze the techniques required for virtual reality environments	K4
CLO4	Assess the methods and techniques appropriate for virtual reality applications	K5
CLO5	Design and manipulate objects within the virtual environment.	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	S	M
CLO2	M	S	S	M
CLO3	M	L	M	M
CLO4	S	M	L	M
CLO5	S	M	M	L

S- Strong; M-Medium; L-Low

UNIT I (11 Hrs)

Introduction: The Three I's of Virtual Reality - A Short History of Early Virtual Reality – Early Commercial VR Technology - **VR Becomes an Industry - The Five Classic Components of a VR System.**

UNIT II (12 Hrs)

Input Devices: Three – Dimensional Position trackers - Hybrid Inertial Trackers - Navigation and Manipulation Interfaces - Tracker-Based Navigation/Manipulation Interfaces – **Three-Dimensional Probes** - Gesture Interfaces - The Pinch Glove - The 5DT Data Glove - The Didjiglove - The Cyber

Glove. Output Devices: Graphics Displays: The Human Visual System -Personal Graphics Displays - Large- Volume Displays - Sound Displays - The Human Auditory System - The Convolvotron– **Speaker Based Three-Dimensional Sound** - **Haptic Feedback: The Human Haptic System - Tactile Feedback Interfaces - Force Feedback Interfaces**

UNIT III   (12 Hrs)

Getting started with Unity and Playmaker: **Downloading and Installing Unity** – **Buying and importing playmaker – Setting up your project.** Unity's and Playmaker's User Interface: Interface overview and main menu – Hierarchy panel – Inspector panel – Project panel – Project panel – Views – Playmaker interface. Components and State Machines: Game objects, components and properties – Working with prefabs – Finite state machines, states and actions – **Interaction between game objects**

UNIT IV   (11 Hrs)

Scripting and Custom Actions: Writing unity script – Overview of standard unity classes – Creating a playmaker action. Networking and Multiplayer: **Understanding networking and multiplayer** – **Setting up photon unity networking** – **Making multiplayer**

UNIT V   (12 Hrs)

Introduction to Augmented Reality: Definition – Examples – Displays - Visual perception -Requirements and characteristics – Tracking - Characteristics of tracking technology- Stationary tracking systems - Mobile sensors. Computer Vision for Augmented Reality: **Natural feature tracking by detection** – **Simultaneous localization and mapping** – **Interaction** - **Output modalities** – Input modalities – Tangible interfaces –Navigation

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Jonathan Linowes ,Krystian Babilinski	Augmented reality for developers	Packt Publishing	2017,1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Jonathan Linowes ,Krystian Babilinski	Augmented Reality : Principles and Practice	Pearson education Inc	2016,1st Edn

Pedagogy: **Lectures, Group Discussions, Demonstrations**

Course Desingner:
Dr.R.Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS23E10	QUANTUM COMPUTING	Theory	58	2	-	4

Preamble

This course introduces the fundamentals of Quantum Computing. It also covers basic architecture of quantum computing.

Prerequisite

Basic Skills in Maths and Physics

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts of quantum mechanics	K2
CLO2	Apply the Quantum Architecture and cryptographic techniques related with Quantum Computation.	K3
CLO3	Analyze the Algorithms required for reality environments	K4
CLO4	Assess the hardware methods and techniques available for Quantum Computing	K5
CLO5	Designing appropriate solution to more complex quantum mechanical systems	K6

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	M	S	M	M
CLO2	S	M	S	M
CLO3	S	M	S	M
CLO4	S	S	L	S
CLO5	S	L	S	S

S- Strong; M-Medium; L-Low.

UNIT I (12 Hrs)

Classical to Quantum: Classical Deterministic Systems, Probabilistic Systems, Quantum Systems, Assembling Systems. **Basic Quantum Theory: Quantum States, Observables,** Measuring, Dynamics, Assembling Quantum Systems.

UNIT II (12 Hrs)

Architecture: Bits and Qubits, Classical Gates, Reversible Gates, Quantum Gates. Algorithms: Deutsch's

Algorithm, The Deutsch–Jozsa Algorithm, Simon's Periodicity Algorithm, **Grover's Search Algorithm, Shor's Factoring Algorithm.**

UNIT III   (12 Hrs)
Programming Languages: Programming in a Quantum World, Quantum Assembly Programming, Toward Higher-Level Quantum Programming, **Quantum Computation Before Quantum Computers.** Theoretical Computer Science: Deterministic and Nondeterministic Computations, Probabilistic Computations, Quantum Computations

UNIT IV   (10 Hrs)
Cryptography: Classical Cryptography, Quantum Key Exchange I: The BB84 Protocol, Quantum Key Exchange II: The B92 Protocol, Quantum Key Exchange III: **The EPR Protocol, Quantum Teleportation.**

UNIT V   (12 Hrs)
Information Theory: Classical Information and Shannon Entropy, Quantum Information and von Neumann Entropy, **Classical and Quantum Data Compression**, **Error-Correcting Codes**. Hardware: Implementing a Quantum Computer I: Ion Traps, Implementing a Quantum Computer II: Linear Optics.

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Noson S. Yanofsky Mirco A. Mannucci Holo Mathics, LLC	Quantum Computing for Computer Scientists	Cambridge University Press	2008

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR &EDITION
1.	Michael Nielsen, Isaac Chuang	Quantum Computation and Quantum Information	Cambridge University Press	2008

Pedagogy: Lectures, Group Discussions, Demonstrations.

Course Designer:
Dr.R.Kowsalya

JOB ORIENTED COURSE

Company: Fintech Software, Coimbatore
Course: Advance Excel & Power BI
Course Modules:
Advanced Excel
    Customizing Excel
    Absolute, Mixed and Relative Referencing
    Formatting and Proofing
    Protecting Excel
    Using 3-D map
    Macro Functions
    Lookup Function
    Data Validation
    Logical Function
    Advanced Paste Special Techniques
Power BI
    Introduction to Power BI
    Power BI Desktop
    Viz and Tiles
    Reports and Dashboards
    Publishing Workbooks and Workspace
    Power BI Report Servers
    Power Query: Text, Number, Append, Merge, Conditional Columns
    DAX Functions
    Table Relationship

Course Code	Course Code	Category	L	T	P	Credits
MNM22CS2	**CYBER SECURITY II**	**Theory**	-	-	-	-

Preamble

This course provides the classification of cyber security and cyber crime and its laws and data privacy and security in social media

Prerequisite

Basics of Internet

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of Cyber security and Cyber security threat landscape.	K2
CLO2	Apply the methods to identify the cyber-attacks and crimes.	K3
CLO3	Analyze the legal framework that exists in India for cybercrime and legal frame work followed by other countries.	K4
CLO4	Estimate the data privacy and security issues related to personal data privacy and security.	K5
CLO5	Create a privacy setting on social media platform and register complaints on a social media platform.	K6

UNIT I   (6 hrs)

Overview of cyber security: Cyber security terminologies - Cyberspace - Cyber attack - Cyber threats - Cyber terrorism - Cyber warfare.

UNIT II   (8 hrs)

Cyber crimes: Cyber Crimes targeting computer system and mobiles- Online scam frauds: emails Scams- Phishing- Vishing- Smishing- Online job fraud- online sextortion- Debit and credit card fraud- Online payment fraud- cyberbullying. Social Media Scam & Frauds: Impersonation- Identify theft -Job scams- Misinformation- Fake news cyber crime against persons - Cyber grooming - Child pornography - cyber stalking-Cyber police station -Crime reporting produce.

UNIT III   (4 hrs)

 Cyber law: Cyber laws and legal and ethical aspects related to new technologies: AI/ML- IoT- Block chain - Darknet and social media- Cyber law of other countries.

UNIT IV   (5 hrs)

Data privacy and Data security: Defining data- Metro-Big data- Non personal data- Data protection-General Data Protection Regulations(GDPR)- 2016 Personal Information Protection and the Electronic document Act(PIPEDA)- Social media Data privacy and Security issues.

UNIT V   **(7 hrs)**

Social Media Platforms and Cyber Security : Case Study on Platform for reporting Cyber Crimes, Checklist for reporting cybercrimes online, Setting privacy settings on social media platforms, Registering complaints on social media platforms, Do's and Don'ts for posting content on social media platforms, prepare password policy for computer and mobile device, security controls for computer and mobile phones , digital Forensics, Cyber Bulling, Phishing, Facebook Attack, Cyber Security audit and Compliance and National Security Policies.

TEXT BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Anand Shinde	Introduction to Cyber Security – Guide to the world of Cyber Security	Notion Press, Sumit Belapure,Nina Godbole	2021 / 1st Edn

REFERENCE BOOKS

S.NO	AUTHOR	TITLE	PUBLISHERS	YEAR & EDITION
1.	Martin Weiss, Michael G. Solomon	Auditing IT Infrastructure for compliance	JonesBartlett Learning.	2015,2nd Edn

Pedagogy: Video Lectures, Case studies

![PSGR Krishnammal College for Women — KCW]

Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

M.Sc. Computer Science

Programme Outcomes

After completion of the programme, the student will be able to,

PLO1: Demonstrate broad knowledge in core areas of computer science, current and emerging technologies in IT

PLO2: Apply higher degree of technical skills in problem solving and application development

PLO3: Gain analytical and managerial skills to enhance employment potential

PLO4: Acquire holistic development with strong emphasison values and ethics

Programme Specific Outcomes

The students at the time of graduation will

PSO1: Identify and formulate complex problems to achieve solutions using concepts of algorithms, advanced networks, database management systems, artificial intelligence, and machine learning

PSO2: Design solutions for complex problems and design processes that meet the specific needs of the society.

PSO3: Create and apply appropriate techniques, resources and tools including prediction and modeling to multifaceted activities

PSO4: Apply programming and technical skills to solve real life complex problems and hence enhance employability

PSO5: Analyze research methods including interpretation of data and synthesis of the information to provide valid conclusions.

PSO6: Demonstrate skills as an individual and as a member or leader in diverse teams

PSO7: Recognize the need for life-long learning and pursue career as a researcher or software engineer.

PSO8: Apply ethical principles and contribute effectively to the welfare of the society

PSGR
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MASTER OF SCIENCE IN COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)
SYLLABUS & SCHEME OF EXAMINATION
2024-2026 BATCH – SEMESTER IV

Semester	Course Code	Title of the Course	Course Type	Instruction hours/week	Contact hours	Tutorial hours	Duration of Examination	Examination Marks			Credits
								CA	ESE	Total	
IV	MCS23PW	Project and Viva-Voce	DSE	30	-	-	-	25	75	100	12
	MCS2014	Block Chain	ACC	-	-	-	3	25	75	100	5*
	MCS2213	Augmented Reality									

DSE - Discipline Specific Elective

*ACC - Additional Learner Courses

CA - Continuous Assessment

ESE - End Semester Examination

QUESTION PAPER PATTERN
Advanced Learners Course (ALC)
Continuous Internal Assessment: 25 Marks

Advanced Learners Course (ALC) Pattern:
One question with a weightage of 4 Marks (4 Questions out of 6 Questions) :4 x 4 = 16
One question with a weightage of 9 Marks (1 Question out of 2 Questions) :1 x 9 = 9
  Total :25 Marks

ESE Question Paper Pattern:
One question with a weightage of 5 Marks (5 Questions out of 8 Questions) :5 x 5 = 25
One question with a weightage of 10 Marks (5 Questions out of 8 Questions) :5 x 10 = 50
  Total :75 Marks

PROJECT AND VIVA VOCE

Students will undergo project work in the final semester for a periodof 4 months (December to March) at any industry / institution approved by the staff coordinator and HOD. It will be evaluated for 100 marks comprising internal marks for 25 and external evaluation for 75 marks.

EVALUATION

Internal evaluation of the project will be carried out in stages as described below

I Review	Selection of the field of study, Topic and Literature Study	05 Marks
II Review	Research design and data Collection	10 Marks
III Review	Analysis and conclusion, preparation of rough Draft	10 Marks
Total		25 Marks

END SEMESTER EXAMINATION

Evaluation of the project marks	50 Marks
Viva Voce marks	25 Marks
Total	**75 Marks**

Viva Voce will be conducted by a panel of external examiner and staff coordinator guiding the project.

Course Code	Course Title	Category	L	T	P	Credit
MCS2014	**BLOCKCHAIN**	**Theory**	**Self-Study**			**5***

Preamble

This course covers the technical principles of blockchain, cryptographic primitives used in blockchain, distributed system concepts, decentralization behind blockchain and the working of bitcoin. It also introduces the Ethereum platform and highlights the tools, use cases of blockchain technology.

Syllabus

UNIT I

Introduction to Blockchain: Distributed systems - History of block chain - Introduction to blockchain - Features -Applications -Tiers - Types of blockchain - Consensus in blockchain- Benefits and limitations

UNIT II

Decentralization: Decentralization using blockchain - Methods -Routes -Blockchain and full ecosystem decentralization Smart Contract Decentralized applications platforms for decentralization

UNIT III

Bitcoin : Bitcoin Public, Private keys Transaction life cycle Transaction structure Types of transaction - Block chain Structure of a block Mining Task of miners- Proof of work Mining algorithm- Bitcoin network - Wallets-Payments

UNIT IV

Ethereum 101: Introduction – Ethereum block chain - Currency Fork - Gas - Elements of Ethereum blockchain- EVM- Accounts- Transaction receipt - Block validation mechanism -Ether Ethereum network

UNIT V

Emerging trends - Tools: Solidity- MetamaskStratis Embark. Use cases: Know Your customer (KYC) and Syndicated loan use case in Finance domain, Interest rate swapping in Banking, Re-insurance in Insurance, Auditing in Hotel reservation, Loyalty management system in retail domain, Order management system in Supply chain.

Text Books

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR & EDITION
1.	Imran Bashir	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	Packt Publishing	2017, 1st Edn
2.	Debajani Mohanty	Blockchain : From Concept to Execution	BPB Publications	2018, 1st Edn

Reference Books

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR & EDITION
1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Bitcoin and cryptocurrency technologies: a comprehensive introduction	Princeton University Press	2016, 1st Edn
2.	Joseph Bonneau et al	SoK: Research perspectives and challenges for Bitcoin and cryptocurrency	IEEE Symposium on security and Privacy	2015, 1st Edn

Course Designers

1. Dr. T.Thendral

2. Dr. R. Kowsalya

Course Code	Course Title	Category	L	T	P	Credit
MCS2213	AUGMENTED REALITY	Theory	Self-Study			5*

Preamble

This course on Augmented Reality (AR) provides students with a comprehensive understanding AR technologies, principles, and applications. Students will learn about the underlying concepts of techniques used in developing AR systems and gain practical experience in creating AR applications.

Syllabus

UNIT I

Introduction to Augmented Reality:Basic concepts of Augmented Reality-Historical background and evolution of AR-AR applications and use cases-Challenges and future trends in AR- AR Technologies and Devices-Marker-based AR-Markerless AR-Projection-based AR-Wearable AR devices- Displays-Multimodal Displays - Audio Displays-Haptic, Tactile, and Tangible Displays- Olfactory and Gustatory Displays

UNIT II

AR Marker Detection and Tracking:Tracking, Calibration, and Registration- Coordinate Systems-Model Transformation - View Transformation - Projective Transformation - Frames of Reference-Mobile Sensors - Global Positioning System - Wireless Networks- Magnetometer- Gyroscope -Linear Accelerometer - Odometer- Computer Vision for Augmented reality- Marker Tracking

UNIT III

Integrating Virtual Content in AR:3D modeling and animation for AR-Texture mapping and lighting in AR-Physics simulations in AR-Audio and haptic feedback in AR-Performance Optimization in AR-Rendering techniques for AR-Optimization for mobile devices-Handling large datasets in AR-Real-time performance considerations

UNIT IV

Interactive Techniques in AR: Spatial mapping and scene understanding-voice and speech recognition in AR-Natural uses interface of AR-Object recognition and tracking- Multi-user and collaborative AR-Networked AR and Remote Collaboration- Synchronization and consistency in multi-user AR.

UNIT V

Evaluation and Testing of AR Applications: Usability testing and user feedback-Performance benchmarking and optimization-User acceptance and adoption studies-Ethical and privacy considerations in AR

Text Books

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR & EDITION
1.	Dieter Schmalstieg, Tobias Hollerer	Augmented Reality : Principles and Practice	Pearson education Inc	2016, 1st Edn
2.	Joseph Howse, Joe Minichino, and Vikas Gupta	Learning OpenCV 4 Computer Vision with Python 3: Get to grips with tools, techniques, and algorithms for computer vision and augmented reality	Packt Publishing	2019, 1st Edn
3	Val Head	Designing Interface Animation: Meaningful Motion for User Experience	Rosenfeld	2019, 1st Edn
4	Mohammad Azam	ARKit and Unity: Build 15 Augmented Reality apps with ARKit 2.0 and Unity	Packt Publishing	2020, 1st Edn

Reference Books

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR & EDITION
1.	Jonathan Linowes , Krystian Babilinski	Augmented reality for developers	Packt Publishing	2017, 1st Edn
2.	William R. Sherman, Alan B. Craig	Understanding Virtual Reality: Interface, Application and Design	Morgan Kaufmann Publishers	2018, 2nd Edn

Pedagogy

Lectures**,** Group Discussions, Demonstrations

Course Designer

1. Dr.T.Thendral
2. Dr.R.Kowsalya