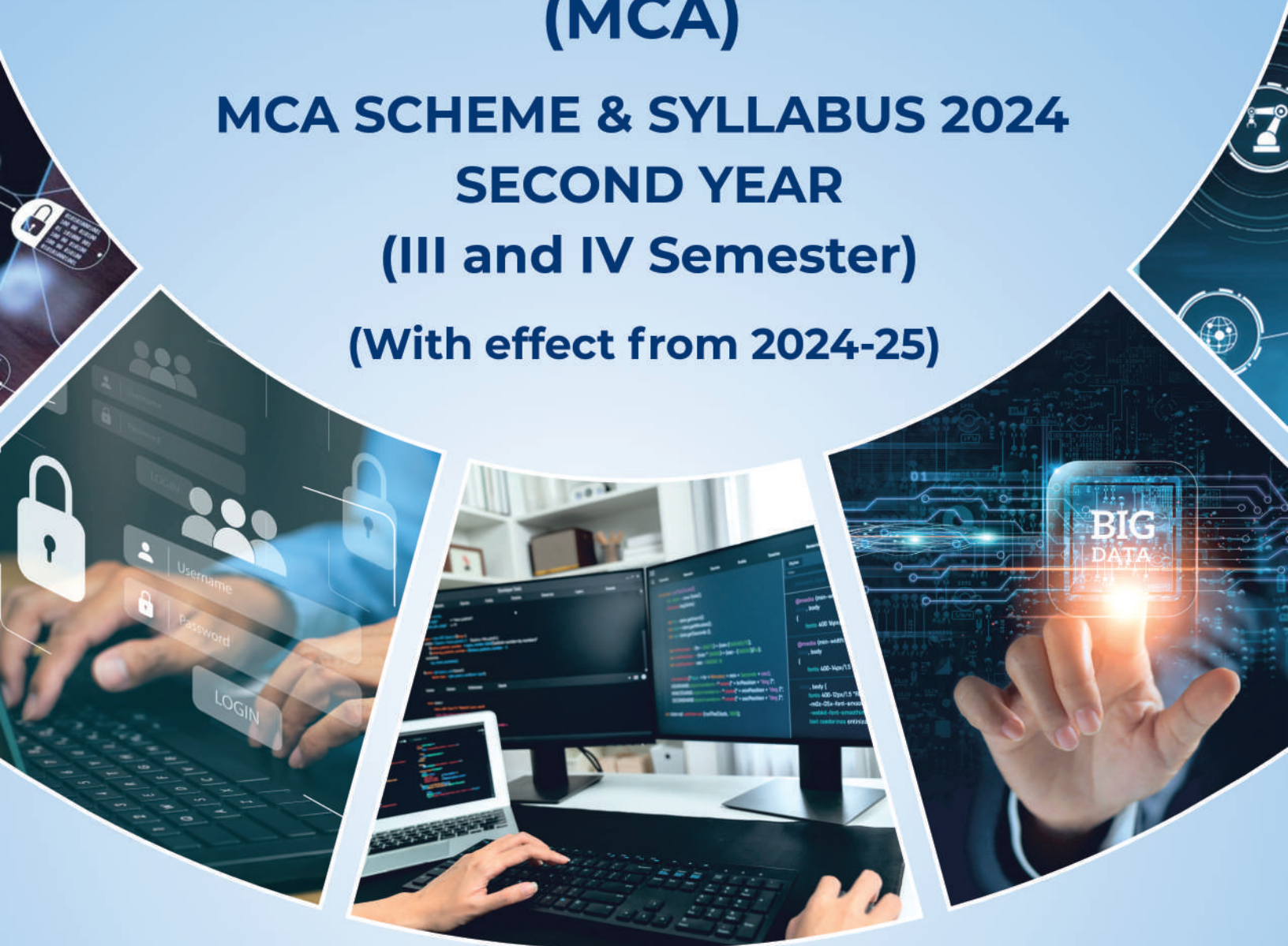


Master of Computer Applications (MCA)

**MCA SCHEME & SYLLABUS 2024
SECOND YEAR**

(III and IV Semester)

(With effect from 2024-25)



ST JOSEPH ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION

Vamanjoor, Mangaluru - 575028

MOTTO

Service and Excellence

VISION

To be a global premier Institution of professional education and research

MISSION

- Provide opportunities to deserving students of all communities, the Christian students in particular, for quality professional education
- Design and deliver curricula to meet the national and global changing needs through student-centric learning methodologies
- Attract, nurture and retain the best faculty and technical manpower
- Consolidate the state-of-art infrastructure and equipment for teaching and research activities
- Promote all-round personality development of the students through interaction with alumni, academia and industry
- Strengthen the Educational Social Responsibilities (ESR) of the Institution



ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution
Vamanjoor, Mangaluru - 575028

Affiliated to VTU – Belagavi & Recognized by AICTE New Delhi
NBA – Accredited: B.E. (ECE, EEE, ME and CIV) & PG (MBA and MCA)
NAAC – Accredited with A+

MCA SCHEME & SYLLABUS 2024 (With effect from 2024-25)

Master of Computer Applications SECOND YEAR (III and IV Semester)

AUTONOMY AND ACCREDITATION

St Joseph Engineering College (SJEC) is an Autonomous Institute under Visvesvaraya Technological University (VTU), Belagavi, Karnataka State, and is recognized by the All-India Council for Technical Education (AICTE), New Delhi. SJEC is registered under the trust “Diocese of Mangalore, Social Action Department”.

The SJEC has been conferred Fresh Autonomous Status from the Academic Year 2021-22. The college was granted autonomy by the University Grants Commission (UGC) under the UGC Scheme for Autonomous Colleges 2018 and conferred by VTU. The UGC Expert Team had visited the college on 28-29 November 2021 and rigorously assessed the college on multiple parameters. The fact that only a handful of engineering colleges in the state have attained Autonomous Status adds to the college’s credibility that has been on a constant upswing. Autonomy will make it convenient for the college to design curricula by recognizing the needs of the industry, offering elective courses of choice and conducting the continuous assessment of its students.

At SJEC, the Outcome-Based Education (OBE) system has been implemented since 2011. Owing to OBE practised at the college, SJEC has already been accredited by the National Board of Accreditation (NBA). Four of the UG programs, namely Mechanical Engineering, Electronics and Communication Engineering, Electrical & Electronics Engineering and Civil Engineering and two of the PG programs, namely, MBA and MCA programs, have accreditation from the NBA.

Also, SJEC has been awarded the prestigious A+ grade by the National Assessment and Accreditation Council (NAAC) for five years. With a Cumulative Grade Point Average (CGPA) of 3.39 on a 4-point scale, SJEC has joined the elite list of colleges accredited with an A+ grade by NAAC in its first cycle. The fact that only a small percentage of the Higher Education Institutions in India have bagged A+ or higher grades by NAAC adds to the college’s credibility that has been on a constant upswing.

The college is committed to offering quality education to all its students, and the accreditation by NAAC and NBA reassures this fact. True to its motto of “Service and Excellence”, the college’s hard work has resulted in getting this recognition, which has endorsed the academic framework and policies that the college has been practicing since its inception. The college has been leveraging a flexible choice-based academic model that gives students the freedom to undergo learning in respective disciplines and a transparent and continuous evaluation process that helps in their holistic development.

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ABOUT THE DEPARTMENT

The Master of Computer Applications (MCA) program, established in 2008 with an intake of 60 students, offers a two-year course approved by the All India Council for Technical Education (AICTE) and is an Autonomous Institution affiliated to Visvesvaraya Technological University (VTU), Belgaum, Karnataka. The MCA program is accredited by National Board of Accreditation (NBA) in the year 2024.

The Computer Applications department at St. Joseph Engineering College, Vamanjoor, Mangaluru emphasizes core courses that delve into design and analysis techniques for the software development across diverse application domains. Additionally, students gain insights into the workings of computers and networks. The program also offers elective courses from emerging fields technologies, such as Artificial Intelligence, Cloud Technologies, Cyber Security, Big Data Analytics, Internet of Things, and Drone Technologies etc, allowing students to explore their individual interests. Greater emphasis will be given on application development to better prepare the students for the industry. Currently the department works with an intake of 120 students.

DEPARTMENT VISION

To be recognized as a department with research environment empowering computer professionals with a strong sense of service and human values at the core.

DEPARTMENT MISSION

- Inculcate professional behavior with strong ethical values and innovative research capabilities among faculty and students.
- To meet the global needs and challenges through training of professionals who can work with interest to support the society.
- Encourage faculty to have continuous progress in their teaching skills and self-development.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates will be able to:

- Have appreciation for, Professional and Ethical responsibilities through strong commitment to values.
- Acquire essential fundamentals and adopt techniques and skills to critically identify, formulate and solve computational problems
- Effectively design, develop and manage computer applications, using modern tools and techniques.
- Develop confidence for self-education and innovative entrepreneurship.

PROGRAM OUTCOMES (POs)

PO1 Foundation Knowledge: Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.

PO2 Problem Analysis: Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.

PO3 Development of Solutions: Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.

PO4 Modern Tool Usage: Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.

PO5 Individual and Teamwork: Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.

PO6 Project Management and Finance: Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.

PO7 Ethics: Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware.

PO8 Life-long learning: Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

III Semester MCA - Scheme of Teaching and Examination													
Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	IPCC	24MCA301	Advances in Web Technologies	MCA	MCA	02	-	02	03	50	50	100	03
2	PCC	24MCA302	Programming using C#.NET	MCA	MCA	03	-	-	03	50	50	100	03
3	PEC	24MC303X	Specializations III	MCA	MCA	03	-	-	03	50	50	100	03
4	PCC	24MCL304	Programming using C#.NET Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
5	SDC	24MCP305	Project Work	MCA	MCA	-	-	22	03	50	50	100	11
Total						09	-	26	15	250	250	500	22

Specializations III: Advanced Technologies and Intelligence	
24MC303A	Machine Learning
24MC303B	Introduction to Generative AI
24MC303C	Deep Learning Fundamentals
24MC303D	Introduction to Drone Technologies
24MC303E	Artificial Intelligence of Things
24MC303F	Big Data Analytics

IV Semester MCA - Scheme of Teaching and Examination													
Sl. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	SDC	24AEC401	MOOCs (Online Courses 16 Weeks duration)	MCA	Any MOOC topic (Choices are given by the Department) with minimum 16 weeks to be completed between I Sem to IV Sem)					-	100	04	
2	SDC	24MCS402	Technical Seminar	MCA	-	-	-	2	02	100	-	100	02
3	INT	24INT403	Research Internship/Industry Internship/Startup Internship	-	-	-	-	-	03	50	50	100	10
Total						-	-	2	05	150	50	300	16

		Semester-wise credit distribution			
Sl. No.	Course Area	I	II	III	IV
1.	BSC	03	-	-	-
2.	PCC	13	13	5	-
3.	IPCC	03	03	3	-
4.	PEC	-	06	3	-
5.	SDC	-	01	11	6
6.	INT	-	-	-	10
Total		19	23	22	16

THIRD SEMESTER

Advances in Web Technologies			
Course Code	24MCA301	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:0:2	SEE	3 Hours
Total Hours	20 hours Theory + 10 Lab slots	Credits	03
Course Learning Objectives: The objective of the course is to • Implement Tailwind CSS and Bootstrap in web Pages. • Design Web Pages using React basics. • Design programs using Advanced React • Understand the basics of Node.js • Apply content management tools to develop web application			
Module-1 Tailwind CSS and Bootstrap (04 hours)			
Tailwind CSS: What is Tailwind CSS? advantages of tailwind CSS, getting started with tailwind, colors, element sizing, flexbox and grid, padding and margins, styling text, typography, borders and shadows. Type Script: Overview of TypeScript, Basic Types and Variables, Functions and Scope, Interfaces and Objects, Compiling and Debugging. Self-Learning Topics: Classes and Object-Oriented Features.			
Module-2 React Basics (04 hours)			
React Basics: The Overview of React and Javascript fundamentals. React installation and setup. Hello World: Hello React World, React.createElement(), JSX, Setup Babel. React Functions: The Life of a Component: A Custom Function Component, A Custom Class Component, Properties. Self-Learning Topics: State, A textarea Component, Make It Stateful.			
Module-3 Advanced React and Introduction to Material UI (04 hours)			
Advanced React: The Life of a Component: A Note on DOM Events, Props Versus State, Props in Initial State, Accessing the Component from the Outside, Lifecycle Methods, Lifecycle Example: Log It All, Lifecycle Example: Using a Child Component. JSX: A Couple Tools, Whitespace in JSX, Comments in JSX, HTML Entities, Spread Attributes, Returning Multiple Nodes in JSX. Material UI: Introduction to Material UI, material UI Components- Buttons, icons, Text Fields, Grid, Box. Self-Learning Topics: Containers. Understanding Material UI's Grid System.			
Module-4 Introduction to Node.js (04 hours)			
Node.js: Welcome to Node.js: Built on JavaScript, Asynchronous and evented, DIRTY applications, DIRTYby default. Working with npm (Node Package Manager). Express.js: Introduction to Express.js: Creating an HTTP Server, Creating routes. Fetching Data: Fetch API. Self-Learning Topics: Introduction to Fetch, Making GET and POST requests using fetch. Handling responses and errors.			
Module-5 Search Engine and Web Content Management System (04 hours)			
Search Engine: Working of Search Engine, Keywords and Metadata sculpting, Basics of Search Engine development and optimization. Web Content Management System: Differences between content, content management, and a content management system. Types of Content Management Systems: WordPress, Drupal, Joomla. Self-Learning Topics: Search Engine Optimization Working of Different Web Content Management Tools.			

PRACTICAL MODULE

PART – A

1. Create a page with Tailwind CSS product cards styled using max-w-sm, shadow-md, rounded-lg, and hover effects like hover:shadow-xl. Style the image with object cover, rounded-t-lg, h-48 and text with font-bold, text-gray-700, and text-sm.
2. Create a developer portfolio website using Tailwind CSS with a responsive navbar, a hero section featuring display-4 text and a btn-primary button, and a projects section using a grid (row and col-md-4) to display three card components. Include a contact form with form-group fields for name, email, and message, and finish with a footer featuring social media icons.
3. Create a React application that includes a form with a textbox component, a dropdown component, and a submit button component. Each form element should be implemented as a separate, reusable component.
4. Build a React application that includes a form to accept a first name and a last name using Material UI components. Instead of a standard “Submit” button, implement a “Greet Me” button that, when clicked, will display an alert with the message “Hello [first name] [last name]!”.
5. Build a simple React application that includes a Material UI button. When the button is clicked, it should toggle the visibility of a Material UI Card component.

PART – B

1. Develop a React application that dynamically displays the capital city of a selected country. Implement the country selection dropdown as a separate, reusable component. The main application component should integrate this dropdown component and, upon selection of a country, display the corresponding capital city.
2. Develop a react application and:
 - i) Build your own Button component and render it three times. On user click, it should alert which button was clicked. (React JS).
 - ii) Use the useState React hook to track how many times a button is clicked, and display the number
3. Create a custom component for rendering each joke present in an array. Using the map function, map through each object in the array. Use the custom component to render each object.
4. create a multi page React application with a navigation bar component and routes using react-router-dom.
5. Create an HTTP server listening on port 1337, which sends Hello, World! to the browser and using Express.
6. Build a React app that fetches, adds, and deletes items from a mock backend server using the fetch API. Items should be displayed, and changes should update both the frontend and backend.

Course Outcomes: At the end of the course the student will be able to:

24MCA301.1	Develop and maintain clean, efficient, and scalable CSS codebases using Tailwind CSS and Typescript.
24MCA301.2	Design pages using react.
24MCA301.3	Apply the concepts of React to create Components and design applications using the Lifecycle method.
24MCA301.4	Build applications using Node.js.
24MCA301.5	Develop Strategies to improve website visibility, content management, optimize web pages for search rankings and familiarize themselves with key features of CMS.
24MCA301.6	Develop Strategies to improve website visibility, content management, optimize web pages for search rankings and familiarize themselves with key features of CMS.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	React: Up & Running: Building Web Applications	Stoyan Stefanov	O'Reilly Media, Inc.	2nd Edition
2	Node.js in Action	Mike Cantelon, Marc	Node.js in Action	Mike Cantelon, Marc
3	React Material-UI Cookbook	Adam Boduch	Pack Publishing	2019
4	The Art of SEO: Mastering Search Engine Optimization	Eric Enge, Jessie Stricchiola, and Stephan Spencer	Shroff/O' Reilly	4th edition 2015
5	Web Content Management	Deane Barker	O'Reilly Media, Inc, USA;	1st edition 2016
6	Tailwind CSS:craft beautiful flexible and responsive designs.	Ivaylo Gerchev	SitePoint	2022
Reference Books				
1	The Road to Learn React	Robin Wieruch	Zaccheus Entertainment	2017
2	Beginning Node.js, Express & MongoDB Development	Greg Lim	Atlantic Publishers	2020
3	Drupal 8 Development Cookbook	Matt Butcher and others	Packt	2017
4	Modern CSS with Tailwind: flexible styling without the fuss	Robert Cook	Wiley, New Delhi	4 th Edition 2017
5	Practical Finite Element Analysis	Noel Rappin	Programmatic bookshelf	2021

Web links and Video Lectures (e-Resources):

Tailwind CSS

- <https://tailwindcss.com/>
- <https://ui.shadcn.com/>
- <https://www.youtube.com/watch?v=ICxcTsOHRjo&t=1874s>

TypeScript

- <https://www.totaltypescript.com/books/total-typescript-essentials/utility-folder-development-in-typescript>
- Microsoft Learn: Get started with TypeScript – <https://learn.microsoft.com/en-us/training/paths/build-javascript-apps-typescript/>
- TypeScript Official Documentation – <https://www.typescriptlang.org/docs/>

React and Next.js

- https://www.youtube.com/watch?v=v0_AT8zaLo8

Material UI

- <https://mui.com/material-ui/>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCA301.1	-	2	2	-	-	-	-	-
24MCA301.2	-	-	2	-	-	-	-	-
24MCA301.3	-	-	2	-	1	-	-	-
24MCA301.4	1	1	-	1	-	-	-	-
24MCA301.5	-	1	-	-	-	-	-	-
24MCA301.6	1	1	2	2	3	-	-	-

1: Low 2: Medium 3: High

Programming using C#.NET			
Course Code	24MCA302	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03
Course Learning Objectives: 1. To Analyze C# and client-server concepts using .Net Frame Work Components. 2. To implement object oriented concepts using C#.NET 3. To design user interface for web applications using WinForms 4. To apply delegates, event and exception handling to incorporate with WinForm, and ADO.NET. 5. To analyze the use of .Net Components depending on the problem statement. 6. To demonstrate a web application using ASP.NET with Database connectivity and AJAX concepts.			
Module-1 Getting started with .NET Framework 4.0 and C# (8 hours)			
Understanding Previous Technologies, Benefits of .NET Framework, Architecture of .NET Framework 4.0,.NET Execution Engine, Components of .NET Framework 4.0. Introducing C# Creating a Simple C# Console Application, Identifiers and Keywords. System Data Types, Variables and Constants: Value Types, Reference Types, Understanding Type Conversions, Boxing and UnBoxing. Variables and constants. .NET Array Types, Namespaces, The System namespace Self-Learning Topics: Introduction to ASP.NET Core: The structure of ASP.NET Core.			
Module-2 Object Oriented Programming in C# (8 hours)			
Object Oriented Programming: Creating a Class, creating an Object, Using this Keyword. Creating an Array of Objects, using the Nested Classes, returning a value from a Method and Describing Access Modifiers. Static Classes and Static Members, Properties: Read-only Property, Static Property, System. Object Class, Encapsulation: Encapsulation using accessors and mutators, Encapsulation using Properties. Inheritance: Inheritance and Constructors, Polymorphism: Compile time Polymorphism/ Overloading, Runtime Polymorphism/ Overriding. Abstraction: Abstract classes, Abstract methods. Interfaces: Syntax of Interfaces, Implementation of Interfaces and Inheritance. Self-Learning Topics: Defining Partial Classes and Methods, Sealed Classes and Sealed Methods			
Module-3 Delegates, Events, Exception Handling and ADO.NET (8 hours)			
Delegates: Creating and using Delegates, Multicasting with Delegates. Events: Event Sources, Event Handlers, Events and Delegates, Exception Handling: The try/catch/throw/finally statement, Custom Exception. System.Exception, Handling Multiple Exception. Data Access with ADO.NET :Understanding ADO.NET: Describing the Architecture of ADO.NET, ADO.NET, ADO.NET Entity Framework. Creating Connection Strings: Syntax for Connection Strings. Creating a Connection to a Database: SQL Server Database. Creating a Command Object. Working with DataAdapters: Creating DataSet from DataAdapter. Self-Learning Topics: OLEDB Database, ODBC Data Source			
Module-4 Graphical User Interface with Windows Forms and WPF (8 hours)			
Windows Forms: Introduction, Windows Forms, Event Handling: A Simple Event- Driven GUI, Control Properties and Layout, Labels, TextBoxes and Buttons, GroupBoxes and Panels, CheckBoxes and RadioButtons, ToolTips, Mouse-Event Handling, Keyboard-Event Handling. Menus, Month Calendar Control, LinkLabel Control, ListBox Control, ComboBox Control, TreeView Control, ListView Control, TabControl and Multiple Document Interface (MDI) Windows.			

Self-Learning Topics:

WPF: New WPF Controls, WPF Architecture: Presentation Framework, Presentation Core, WindowsBase, MIL or Milcore,

Module-5 Web App Development and Data Access using ADO.NET (8 hours)

Introduction, Web Basics, Multitier Application Architecture, Your First Web Application: Understanding Master pages, Standard Web Controls: Designing a Form, Validation Controls, Grid View Control, DropDownList, Session Tracking, ASP.NET AJAX: Exploring AJAX, Need for AJAX

Self-Learning Topics:

AJAX Server Controls: Script Manager control, Update Panel, Update Progress Control.

Course Outcomes: At the end of the course the student will be able to:

24MCA302.1	Analyze C# and client-server concepts using .Net Framework Components.
24MCA302.2	Implement object oriented concepts using C#.NET
24MCA302.3	Design user interfaces for web applications using WinForms
24MCA302.4	Apply delegates, events and exception handling
24MCA302.5	Apply data manipulation operations with ADO.net objects
24MCA302.6	Explain a web application development using ASP.NET with Database connectivity and AJAX concepts.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	.NET 4.0 Programming (6-in-1), Black Book. (Chapters: 1,10,11,12,13,14, 19 and 33).	Kogent Learning Solutions Inc.	Dream Tech Press	1 January 2011
2	C# 2010 for Programmers, (Chapters: 14,15,19 and 27.3)	Paul Deitel and Harvey Deitel	Pearson Education.	4th Edition, 2010
Reference Books				
1	Pro C# 5.0 and the .NET 4.5 Framework,	Andrew Trolsen	Apress	6th Edition, 2012
2	Pro ASP.NET Core 6 (E Book)	Adam Freeman	Apress	9th edition 25 February 2022
3	Complete Reference C# 4.0	Herbert Schildt	McGraw Hill	1st edition 16 June 2010

Additional Resources: Web links/NPTEL Courses

- <https://tinyurl.com/Learn-C-SHARP-Programming>
- <https://tinyurl.com/ASP-DOT-NET-CORE-WITH-ADO>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCA302.1	2	2	-	-	-	-	-	-
24MCA302.2	2	2	-	-	-	-	-	-
24MCA302.3	2	2	-	-	-	-	-	-
24MCA302.4	2	2	-	-	-	-	-	-
24MCA302.5	-	-	2	2	-	-	-	-
24MCA302.6	-	-	2	2	-	-	-	2

1: Low 2: Medium 3: High

Machine Learning			
Course Code	24MC303A	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03
Course Learning Objectives: 1. To understand the basic theory underlying machine learning, types, and the process. 2. To become familiar with data and visualize univariate, bivariate, and multivariate data using statistical techniques and dimensionality reduction. 3. To understand various machine learning algorithms such as similarity-based learning, regression, decision trees. 4. To familiarize with learning theories, probability-based models, and reinforcement learning, developing the skills required for decision-making in dynamic environments.			
Module-1 (8 hours)			
Introduction to Machine Learning: Need for Machine Learning, Machine Learning Explained, Machine Learning in Relation to Other Fields, Types of Machine Learning, Challenges of Machine Learning, Machine Learning Process, Machine Learning Application.			
Understanding Data: Introduction, Big Data Analytics and Types of Analytics, Big Data Analysis Framework, Descriptive Statistics, Univariate Data Analysis and Visualization, Bivariate Data and Multivariate Data.			
Self-Learning Topics: Bivariate Data and Multivariate Data. Textbook 1: Ch 1, 1.1-1.7, Ch 2, 2.1-2.6			
Module-2 (8 hours)			
Understanding Data: Multivariate Statistics, Essential Mathematics for Multivariate Data, Overview of Hypothesis, Feature Engineering and Dimensionality Reduction Techniques.			
Basics of Learning Theory: Introduction to Learning and its Types, Introduction to Computation Learning Theory, Design of a Learning System, Introduction to Concept Learning, Induction Biases, Self			
Self-Learning Topics: Modelling in Machine Learning. Textbook 1: Ch 2, 2.7-2.10, Ch 3 3.1 – 3.6			
Module-3 (8 hours)			
Similarity-based Learning: Introduction to Similarity or Instance-based Learning, Nearest-Neighbor Learning, Weighted K-Nearest-Neighbor Algorithm, Nearest Centroid Classifier, Locally Weighted Regression (LWR).			
Regression Analysis: Introduction to Regression, Introduction to Linearity, Correlation, and Causation, Introduction to Linear Regression, Validation of Regression Methods, Multiple Linear Regression			
Self-Learning Topics: Polynomial Regression, Logistic Regression. Textbook 1: Ch 4, 4.1 – 4.5, Ch 5, 5.1 – 5.7			
Module-4 (8 hours)			
Decision Trees Learning: Introduction to Decision Tree Learning model, Decision Tree Induction Algorithms, Validating and Pruning of Decision Trees.			
Bayesian Learning: Introduction to Probability-based Learning, Fundamentals of Bayes Theorem, Classification Using Bayes Model.			
Self-Learning Topics: Decision Trees Learning Textbook 3: Lesson 11 and 12.			

Module-5 (8 hours)	
Artificial Neural Networks: Introduction, Biological Neurons, Artificial Neurons, Perceptron and Learning Theory, Types of Artificial Neural Network. Reinforcement Learning: Overview and Scope of Reinforcement Learning, Components of Reinforcement Learning, Q-Learning. Self-Learning Topics: Artificial Neural Networks Textbook 1: Ch 10, 10.1-10.5, Ch 14, (14.1, 14.2, 14.4, 14.9)	

Course Outcomes: At the end of the course the student will be able to:	
24MC303A.1	Describe Machine Learning and Big Data Analytics
24MC303A.2	Differentiate between Learning Theories.
24MC303A.3	Apply Similarity Based, Instance Based Learning and Regression Analysis for real world problems.
24MC303A.4	Predict Decision Tree and Probability Based Learning.
24MC303A.5	Describe Artificial Neural Network and Reinforcement Learning.
24MC303A.6	Implement a decision system model by applying any one Machine Learning Algorithm.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Machine Learning	S Sridhar and M Vijayalakshmi,	Oxford University Press	2021
2	Machine Learning: Theory and Practice	M N Murty and Ananthanarayana V S	Universities Press (India) Pvt. Limited	2024
3	Machine Learning	Tom M. Mitchell	McGraw-Hill Education	2013
Reference Books				
1	Introduction to machine learning	Ethem Alpaydin	PHI Learning Pvt. Ltd.	2nd edition 2015
2	An Introduction to Machine Learning	Miroslav Kubat	Springer	2017
3	The Elements of Statistical Learning	Trevor Hastie, Robert Tibshirani, Jerome Friedman	Springer series in statistics.	2nd Edition 2009

Additional Resources: Web links/NPTEL Courses	
• https://www.universitiespress.com/resources?id=9789393330697 • https://onlinecourses.nptel.ac.in/noc23_cs18/preview • https://www.geeksforgeeks.org/machine-learning/ • https://www.w3schools.com/python/python_ml_getting_started.asp	

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303A.1	-	2	-	-	1	-	-	-
24MC303A.2	-	-	-	-	1	-	-	3
24MC303A.3	-	-	-	-	-	2	-	-
24MC303A.4	-	-	-	-	-	2	-	-
24MC303A.5	-	-	-	-	-	2	-	-
24MC303A.6	-	-	-	-	-	2	-	-

1: Low 2: Medium 3: High

Introduction to Generative AI			
Course Code	24MC303B	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03
Course Learning objectives: - Understand the Fundamentals of Generative AI - Master in Core Generative AI Models: GANs, VAEs, and Diffusion Models - Develop Practical Skills in Generative AI Using Popular Frameworks - Explore the Ethical Implications and Social Impact of Generative AI - Apply Generative AI to Real-World Applications			
Module-1 (8Hrs)			
Introduction to AI and Machine Learning- Neural Networks: Basic Architecture, Backpropagation, Activation Functions-Deep Learning Basics and its Applications-Unsupervised vs. Supervised Learning Self-learning Topics: Types of Generative Models (e.g., LLM,SLM,GANs, VAEs, Autoregressive Models), Backpropagation, Activation Functions			
Module-2 (8Hrs)			
Introduction to Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs)- Understanding the Generator-Discriminator Architecture in GANs-Latent Space Representation and Loss Functions-Training Strategies, Optimization, and Hyperparameter Tuning-Applications and Self-learning Topics: Case Studies in Image, Video, and Text Generation-Diffusion Models Modern AI Art Generation			
Module-3 (8Hrs)			
Introduction to TensorFlow and PyTorch for Generative AI Building GANs and VAEs from Scratch Hands-on Projects: Generating Images, Music, and Text Self-learning Topics: Model Evaluation Techniques (FID Score, Inception Score, BLEU Score), Fine-tuning Pretrained Models for Specialized Applications			
Module-4 (8Hrs)			
Ethical Challenges in AI: Bias, Fairness, and Accountability, AI in Content Creation: Copyright, Ownership, and Creativity - Data Privacy in Generative AI Systems. Self-learning Topics: Deepfakes and Synthetic Media: Risks and Regulations, Bias and Fairness in Training Data: Identifying and Mitigating			
Module-5 (8Hrs)			
AI in Digital Art and Content Creation - Healthcare Applications: Drug Discovery and Medical Imaging - Natural Language Generation (NLG) and Chatbots Self-learning Topics: Case Studies: Generative AI in Gaming, Fashion, and Virtual Reality, - Music Generation Using Neural Networks			

Course Outcomes: At the end of the course the student will be able to:	
24MC303B.1	Understand the Fundamentals concepts of Generative AI
24MC303B.2	Identify the performance of generative models using metrics
24MC303B.3	Analyze the ethical implications of generative AI
24MC303B.4	Apply algorithms to build and train generative models using frameworks
24MC303B.5	Compare the performance of various generative AI architectures
24MC303B.6	Design and implement generative AI-based prototypes to address domain-specific problems

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Introduction to Generative AI	Numa Dhamani and Maggie Engler	Manning Publications	2 nd Edition, August 2025
2.	Generative AI with LangChain: Build large language model (LLM) apps with Python, ChatGPT, and other LLMs	Ben Auffarth	Packt Publications	1 st Edition, December 2023
3.	GANs in Action: Deep Learning with Generative Adversarial Networks	Vladimir Bok and Jakub Langr	Manning Publications	1 st Edition, September 2019
Reference Books				
1.	Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play	David Foster	O'Reilly Media	2 nd Edition, April 2023
2.	Machine Learning with TensorFlow	Gohil P	BPB Publications	1 st Edition, 2019
3.	Deep Learning: A Practitioner's Approach	Akerkar R	Springer	1 st Edition, 2020
4.	Artificial Intelligence: A Guide for Thinking Humans	Arora R	Wiley India Pvt. Ltd.	1 st Edition, 2021
5.	The Fourth Industrial Revolution	Schwab K.	Penguin Random House India	1 st Edition, 2017

Web links/Video Lectures/MOOCs

1. Gen AI Tutorial for Beginners by Simplilearn - <https://www.youtube.com/live/QnzZNKueUmo?si=dkL-hQUbkfZgYLBu>
2. Introduction Course to Autoencoders, VAEs, and GANs: <https://www.coursera.org/learn/introduction-course-to-autoencoders-vaes-and-gans>
3. Deep Learning for Computer Vision: https://onlinecourses.nptel.ac.in/noc21_cs93/preview
4. Flow and Diffusion Models: <https://diffusion.csail.mit.edu>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303B.1	2	-	-	-	-	-	-	-
24MC303B.2	-	2	-	-	1	-	-	-
24MC303B.3	-	-	-	-	-	-	2	1
24MC303B.4	-	-	2	2	-	-	-	-
24MC303B.5	-	2	-	-	-	-	-	-
24MC303B.6	-	-	2	-	-	1	-	-

1: Low 2: Medium 3: High

Deep Learning Fundamentals			
Course Code	24MC303C	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40	Credits	03
Course Learning Objectives: 1. Understand the biological and mathematical foundations of neural networks, perceptrons, and their theoretical significance. 2. Explore multilayer perceptrons and the backpropagation algorithm for solving non-linear classification problems. 3. Learn and apply regularization techniques and optimization strategies to improve model generalization and training. 4. Analyze and implement convolutional neural networks (CNNs) for feature extraction and image-related tasks. 5. Understand the structure and training of recurrent neural networks (RNNs), including LSTMs and encoder-decoder models, for sequence learning. 6. Integrate knowledge from multiple deep learning architectures and algorithms to solve real-world AI problems efficiently.			
Module-1 Introduction and Rosenblatt's Perceptron (8Hrs)			
Introduction: What is a Neural Network? The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Feedback, Network Architectures Rosenblatt's Perceptron: Introduction, Perceptron, The Perceptron Convergence Theorem. Self-Learning Topics: Relation Between the Perceptron and Bayes Classifier for a Gaussian Environment.			
Module-2 Multilayer Perceptrons (8Hrs)			
Multilayer Perceptrons: Introduction, Some Preliminaries, Batch Learning and On-Line Learning, The Back-Propagation Algorithm, XOR Problem, Heuristics for Making the Back- Propagation Algorithm Perform Better, Computer Experiment: Pattern Classification. Self-Learning Topics: Back Propagation and Differentiation.			
Module-3 Regularization for Deep Learning and Optimization for Training Deep Models (8Hrs)			
Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under Constrained Problem, Dataset Augmentation. Optimization for Training Deep Models: How Learning Differs from pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies. Self-Learning Topics: Semi-Supervised Learning, Algorithms with Adaptive Learning Rate.			
Module-4 Convolution Networks (8Hrs)			
Convolution Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features. Self-Learning Topics: The Neuroscientific Basic for Convolutional Networks and the History of Deep Learning.			

Module-5 Sequence Modeling (8Hrs)	
Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to- Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks.	
Self-Learning Topics: The Long Short-Term Memory and Other Gated RNNs.	

Course Outcomes: At the end of the course the student will be able to:	
24MC303C.1	Demonstrate the structure and functionality of neural networks, including perceptrons and their relationship to classifiers.
24MC303C.2	Implement and analyze multilayer perceptrons using the backpropagation algorithm to solve classification problems.
24MC303C.3	Apply regularization techniques and optimization algorithms to enhance the performance of deep learning models.
24MC303C.4	Design and train convolutional neural networks (CNNs) for tasks such as image classification and pattern recognition
24MC303C.5	Develop recurrent and recursive neural networks for sequence modeling and time-series data processing.
24MC303C.6	Evaluate and integrate advanced deep learning techniques to address complex real-world applications.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Deep Learning	Ian Goodfellow, YoshuaBengio, Aaron Courville	MIT Press,	2016
Reference Books				
1	Neural Networks and Deep Learning	Aggarwal Charu C	Spinger India Pvt.Ltd	2018
2	Neural Networks and Deep Learning Machines	Haykin Simon	Prentice Hall of India	2013
3	Deep Learning with Applications using Python	Manaswi Navin Kumar	Apress	2024

Additional Resources: Web links/NPTEL Courses	
1.) Deep Learning:	https://nptel.ac.in/courses/106105215
2.) Machine Learning and Deep Learning - Fundamentals and Applications:	https://nptel.ac.in/courses/108103192
3.) Fundamentals of Deep Learning:	https://www.oreilly.com/ai/free/files/fundamentals-of-deep-learning-sampler.pdf
4.) Fundamentals of Deep Learning:	https://www.coursera.org/learn/fundamentals-of-deep-learning

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303C.1	3	2	-	-	-	-	-	-
24MC303C.2	3	2	-	-	-	-	-	-
24MC303C.3		3	2	-	-	-	-	-
24MC303C.4	2	3	2	-	-	-	-	-
24MC303C.5		2	2	2	-	-	-	-
24MC303C.6	3	2	2	2	2	-	2	2

1: Low 2: Medium 3: High

Introduction to Drone Technologies			
Course Code	24MC303D	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40	Credits	03
Course Learning Objectives: 1. To Demonstrate basic knowledge of drone technologies, their components, evolution, regulations, ethics, and applications. 2. To Operate drones safely using basic flight principles and controls. 3. To Understand and apply navigation, sensing, and regulatory principles for controlled and autonomous drone operations. 4. To Perform basic drone maintenance, troubleshooting, and minor repairs to ensure safe and reliable operation. 5. To Understand advanced drone tech, future trends, and how data improves drone use. 6. To Gain essential skills and knowledge for safe and effective drone use and management.			
Module-1 Overview of Drone Technologies (8 hours)			
Introduction to Drones-Definition and classification, Historical development. Components of Drones-Frame and body, Propulsion systems, Flight controllers, Sensors and cameras, Communication systems/protocols Regulations and Ethics-Overview of drone regulations, Responsible drone usage, Privacy concerns and ethical considerations Applications of Drones-Agriculture, Surveying and mapping, Search and rescue, Filmmaking and photography, Environmental monitoring. Self-Learning Topics: Surveying and mapping, Search and rescue, Filmmaking and photography, Environmental monitoring.			
Module-2 Drone Flight Principles (8 hours)			
Aerodynamics of Drones-Lift, thrust, drag, and weight, Basic principles of flight, Flight Modes-Manual mode, GPS-assisted mode, Autonomous flight. Pre-flight Checks and Safety Procedures-Importance of pre-flight checks, Emergency procedures, Safety guidelines Flight Training-Basic flight controls, Take off and landing procedures, Troubleshooting common issues. Self-Learning Topics: Pre-flight Checks and Safety Procedures-Importance of pre-flight checks, Emergency procedures, Safety guidelines Flight Training-Basic flight controls.			
Module-3 Drone Navigation and Control (8 hours)			
GPS Technology-Role of GPS in drone navigation, Waypoints and geofencing Remote Sensing and Image Processing-Types of sensors used in drones, Image processing techniques Autonomous Navigation-Introduction to autonomous flight, Programming flight paths Regulatory Compliance/Standards-Understanding airspace regulations, Registration and licensing requirements. Self-Learning Topics: Understanding airspace regulations, Registration and licensing requirements			
Module-4 Drone Maintenance and Repairs (8 hours)			
Routine Maintenance-Battery care and maintenance, Propeller inspection and replacement Troubleshooting and Diagnostics-Identifying common issues, Using diagnostic tools Firmware Updates-Importance of firmware and updates, Update procedures for various components Repair Techniques-Basic repairs for common issues, Knowing when to seek professional help. Self-Learning Topics: diagnostic tools Firmware Updates-Importance of firmware and updates			
Module-5 Advanced Applications and Future Trends (8 hours)			
Advanced Drone Technologies-Beyond visual line of sight (BVLOS) operations, Swarm technology. Emerging Trends-Artificial Intelligence in drones, Integration with other technologies (5G, IoT)			

Industry-specific Applications-Case studies in various industries, Future job opportunities in drone technology IoT Sensors for Drone Navigation-Overview of IoT sensors for navigation and data collection, Integration of GPS, accelerometers, and other sensors IoT Data Analysis for Flight Optimization-Utilizing IoT-generated data for optimizing drone flights, Exercises on data analysis tools.

Self-Learning Topics: Exercises on data analysis tools, Integration with other technologies (5G, IoT) Industry-specific Applications-Case studies in various industries

Course Outcomes: At the end of the course the student will be able :

24MC303D.1	Demonstrate basic knowledge of drone technologies, their components, evolution, regulations, ethics, and applications
24MC303D.2	Operate drones safely using basic flight principles and controls
24MC303D.3	Understand and apply navigation, sensing, and regulatory principles for controlled and autonomous drone operations
24MC303D.4	Perform basic drone maintenance, troubleshooting, and minor repairs to ensure safe and reliable operation
24MC303D.5	Understand advanced drone tech, future trends, and how data improves drone use
24MC303D.6	Gain essential skills and knowledge for safe and effective drone use and management

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Drone University	John M. Glover	Drone University	2 nd Edition 2014
2	Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs	John Baichtal	Que Publishers	2 nd Edition 2016
3	Drones For Dummies	Mark LaFay	For Dummies	1 st Edition, 2015
Reference Books				
1	Build a Drone: Step-by-Step Guide	Barry Davies	Skyhorse	1 st Edition, 2016
2	Drones: What Everyone Needs to Know	Sarah E. Kreps	Oxford University Press	1 st Edition, 2016

Additional Resources: Web links/NPTEL Courses

- https://onlinecourses.nptel.ac.in/noc25_ae30/preview (Drone Systems and Control)
- <https://www.udemy.com/course/drone-technology-for-beginners/?couponCode=PMNVD2025> (Drone Technology for Beginners)

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303D.1	3	2	1	2	-	-	-	1
24MC303D.2	2	2	-	2	-	-	-	1
24MC303D.3	3	2	1	3	-	-	-	2
24MC303D.4	3	3	-	3	-	-	-	2
24MC303D.5	2	2	1	3	-	-	-	2
24MC303D.6	2	2	1	3	-	1	1	3

1: Low 2: Medium 3: High

Artificial Intelligence of Things			
Course Code	24MC303E	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40	Credits	03
Course Learning objectives: - Understand the fundamentals of AIoT - Analyze security challenges in AIoT networks - Evaluate different architectural models for AIoT - Examine the role of new technologies in AIoT - Explore advanced concepts in AIoT			
Module-1 (8 Hrs)			
Artificial Internet of Things (A New Paradigm of Connected Networks): Internet of Things, Artificial Intelligence, Applications, The Convergence of AIoT, AIoT Architecture, Communication and Networks, Existing Challenges and Issues, Advanced AIoT Applications and Services: Convergence of IoT and Artificial Intelligence, Artificial Intelligence in IoT Applications, Security Requirements for IoT Applications, Security Attacks in IoT Applications. Self-Learning Topics: Security in AIoT Networks, IoT Security Challenges and Solutions			
Module-2 (8 Hrs)			
Tri-Tier Architectures for AIoT Networks: AI Usage in AIoT Networks, Tri-Tier AIoT architecture, Cloud architecture for AIoT networks, Edge computing for AIoT networks. AI Based Software Define Network. Standards and Policies Adoption for AIoT Networks: IoT Ecosystem, Layer Wise Communication Standards, Network Layer Standards, Network Layer Encapsulation Protocols, Session Layer Protocols, IoT Management Standards, IoT Protocols Security, Challenges To Adopt Standards And Protocols. Self-Learning Topics: Standards and Organizations, IoT Management Standards, IoT Protocols Security			
Module-3 (8 Hrs)			
Networking and Protocols for AIoT Networks: A Blend of IoT and Artificial Intelligence, , AIoT Protocols Novel Machine, and Deep Learning, and Training Techniques for AIoT: Classification Based On Smart Home Technologies Self-Learning Topics: AIoT Networking Stack, AIoT Computing Layers, Classification Based On AIoT Device Control Approaches			
Module-4 (8 Hrs)			
Role of Block Chain Models for AIoT Communication Systems: Block chain's Impact On AI: Key Features and Advantages, Role of Block Chain in AI IoT Applications Big Data Analytics for AIoT Network: Three-tier computing architecture of AIoT, Evaluation Of Big Data In AIoT Self-Learning Topics: Block chain Integration with AI, Big Data Analytics For AIoT Applications.			
Module-5 (8 Hrs)			
Green Communication Systems for AIoT Networks: Mobile Edge Computing in M2M Communications, Wireless Network Virtualization and e-SIM in M2M Communications, AI-Based Wireless Communication, challenges. Future Privacy and Trust Challenges for AIoT Networks: AIoT security challenges, Classification of AIoT attacks. Security Requirements for AIoT, Trustworthiness			

Self-Learning Topics: Green Communication Smart Grid Systems, Future Trends of AIoT, Current Open Challenges And Future Directions.

Course Outcomes: At the end of the course the student will be able to:	
24MC303E.1	Understand the fundamental concepts of AIoT, including the convergence of AI and IoT, its architecture, and its applications in connected networks.
24MC303E.2	Analyze the security challenges and issues in AIoT networks, and identify appropriate solutions to mitigate various security attacks.
24MC303E.3	Evaluate the different architectural models for AIoT, such as Tri-Tier, cloud, and edge computing, to determine their suitability for various applications.
24MC303E.4	Apply appropriate networking protocols and novel machine and deep learning techniques to build and train AIoT systems.
24MC303E.5	Examine the role of block chain and big data analytics in securing and managing data within AIoT communication systems.
24MC303E.6	Design a conceptual framework for a green communication system that addresses future privacy and trust challenges in AIoT networks.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Artificial Intelligence of Things (AIoT): New Standards, Technologies and Communication Systems	Dr Kashif Naseer Qureshi, Prof. Thomas Newe	CRC Press	1 st Edition, April 2024
2.	AIoT: Artificial Intelligence of Things	Arun Sekar Rajasekaran, Fadi Al-Turjman, Suganyadevi S	Routledge	1 st Edition, 2025
3.	Artificial Intelligence-based Internet of Things Systems	Souvik Pal, Debashis De, Rajkumar Buyya	Springer Nature Switzerland AG	1 st Edition, 2022
Reference Books				
1.	AIoT Technologies and Applications for Smart Environments	Mamoun Alazab, Meenu Gupta, Shakeel Ahmed	IET Digital Library	1 st Edition, 2022
2.	Artificial Intelligence of Things (AIoT) for Productivity and Organizational Transition	Sajad Rezaei, Amin Ansary	IGI Global Scientific Publishing	1 st Edition, 2024

Web links/Video Lectures/MOOCs

- The Architect's Guide to the AIoT (Cisco): <https://outshift.cisco.com/blog/architects-guide-to-aiot-1>
- AIoT overview - https://youtu.be/hY2U7_lhFUg?si=DFVofv2l5VS_4bOk
- AI, Machine Learning, Deep Learning and Generative AI Explained - <https://youtu.be/qYNweeDHiyU?si=MYjgcZ1wfPw37-G4>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303E.1	2	-	-	-	-	-	-	-
24MC303E.2	-	2	-	-	-	-	-	-
24MC303E.3	-	-	2	-	-	-	-	-
24MC303E.4	-	-	-	2	-	-	-	-
24MC303E.5	-	2	-	-	-	-	-	-
24MC303E.6	-	-	-	-	-	2	2	-

1: Low 2: Medium 3: High

Big Data Analytics			
Course Code	24MC303F	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40	Credits	03
Course Learning Objectives: 1. To identify the business problem for a given context and frame the objectives to solve it through data analytics tools. 2. To demonstrate various technologies for handling large volumes of data. 3. To describe the Hadoop ecosystem. 4. To illustrate the architecture of HDFS and explain the functioning of HDFS clusters. 5. To analyze the usage of Map-Reduce techniques for solving big data problems. 6. To analyze and visualize various datasets.			
Module-1 Big Data and Analytics (8 hours)			
Example Applications, Basic Nomenclature, Analysis Process Model, Analytical Model Requirements , Types of Data Sources, Sampling, Types of Data Elements, Data Exploration, Exploratory Statistical Analysis, Missing Values, Outlier Detection and Treatment.			
Self-Learning Topics: Standardizing Data Labels, Categorization			
Module-2 Big Data Technology (8 hours)			
Hadoop's Parallel World, Data discovery, Open source technology for Big Data Analytics, Cloud and Big Data, Predictive Analytics, Mobile Business Intelligence and Big Data, Crowd Sourcing Analytics.			
Self-Learning Topics: Inter- and Trans-Firewall Analytics.			
Module-3 Meet Hadoop (8 hours)			
Data, Data Storage and Analysis, Comparison with Other Systems, RDBMS, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem Hadoop Releases Response.			
Self-Learning Topics:			
Module-4 The Hadoop Distributed File system (8 hours)			
The Design of HDFS, HDFS Concepts, Blocks, Namenodes and Datanodes, HDFS Federation, HDFS High-Availability, The Command-Line Interface, Basic Filesystem Operations, HadoopFilesystems Interfaces, The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the FileSystem API, Writing Data, Directories, Querying the Filesystem, Deleting Data, Data Flow Anatomy of a File Read, Anatomy of a File Write, Coherency Model, Hadoop Archives.			
Self-Learning Topics: Parallel Copying with distcp Keeping an HDFS Cluster Balanced.			
Module-5 Big Data Processing with Hadoop: Concepts, Tools, and MapReduce Applications (8 hours)			
A Weather Dataset ,Data Format, Analysing the Data with Unix Tools, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner functions, Running a Distributed Map Reduce Job, Hadoop Streaming, Hadoop Pipes, Compiling and Running, Developing a Map Reduce Application, The Configuration API, The Map Reduce Web UI.			
Self-Learning Topics: Combining Resources, Variable Expansion.			
Course Outcomes: At the end of the course the student will be able to:			
24MC303F.1	Identify the business problem for a given context and frame the objectives to solve it through data analytics tools.		
24MC303F.2	Demonstrate various technologies for handling large volumes of data.		

24MC303F.3	Describe Hadoop ecosystem.
24MC303F.4	Illustrate the architecture of HDFS and explain functioning of HDFS clusters.
24MC303F.5	Analyze the usage of Map-Reduce techniques for solving big data problems.
24MC303F.6	Analyze and visualize various datasets

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Analytics in a Big Data World: The Essential Guide to Data Science and its Applications”	Bart Baesens	Wiley	2 nd edition, Updated for Python 3,2016
2	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s	Michael Minelli, Michehe Chambers	Wiley CIO Series	1 st Edition, 2013
3	Hadoop: The Definitive Guide	Tom White	O’reilly	3 rd Edition, 2012.
Reference Books				
1	Professional Hadoop Solutions	Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich,	Wrox A Wiley Brand	2nd edition 2015
2	Understanding Big data	Chris Eaton, Dirk deroos et al.	McGraw Hill,	1 st Edition 2012
3	Big Data Analytics with R and Haoop	Vignesh Prajapati	PACKT Publishing	1 st Edition, 2013
4	Oracle Big Data Handbook	Tom Plunkett, Brian Macdonald.	Oracle Press	1 st Edition, 2013

Web links/Video Lectures/MOOCs

- <https://www.coursera.org/learn/big-data-analytics-1>
- <https://www.coursera.org/learn/introduction-to-data-analytics>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MC303F.1	2	2	-	2	-	-	-	-
24MC303F.2	3	2	-	-	-	-	-	-
24MC303F.3	2	-	2	-	-	-	-	-
24MC303F.4	2	2	-	-	-	-	-	-
24MC303F.5	2	2	-	2	-	-	-	-
24MC303F.6	-	2	-	3	-	-	-	-

1: Low 2: Medium 3: High

Programming using C#. NET Laboratory			
Course Code	24MCL304	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Practical	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(1:0:2)	SEE	3 Hours
Total Hours		Credits	02
Course Learning Objectives: 1. Implement a C# program that accepts command-line arguments, 2. Implement boxing and unboxing operations in C# 3. Implement operator overloading in C# 4. Implement jagged arrays in C# with iteration techniques for multidimensional arrays. 5. Design and implement database interactions using ADO.NET. 6. Develop ASP.NET web applications by integrating databases in the applications.			
Part- A Console Applications using C#.NET			
1. Write a Program in C# to demonstrate Command line arguments processing for the following. a) To find the square root of a given number. b) To find the sum & average of three numbers. 2. Write a Program in C# to demonstrate the following a) Boxing and Unboxing b) Invalid Unboxing. 3. Write a program in C# to add Two complex numbers using Operator overloading. 4. Write a Program in C# to find the sum of each row of given jagged array of 3 inner arrays. 5. Write a Program in C# to demonstrate Array Out of Bound Exception using Try, Catch and Finally blocks. 6. Write a Program to Demonstrate Use of Virtual and override key words in C# with a simple program. 7. Write a Program in C# to create and implement a Delegate for any two arithmetic operations 8. Write a Program in C# to demonstrate abstract class and abstract methods in C#. 9. Write a program to Set & Get the Name & Age of a person using Properties of C# to illustrate the use of different properties in C#. 10. Write a Program in C# Demonstrate arrays of interface types (for runtime polymorphism).			
Part- B ADO.NET and ASP.NET: Application Development			
I. Consider the Database db_EMS (Employee Management System) consisting of the following tables : tbl_Designations (IdDesignation: int, Designation: string) tbl_EmployeeDetails (IdEmployee: int, EmployeeName: string, ContactNumber: string, IdDesignation: int, IdReportingTo: int) Develop a suitable window application using C#.NET having following options. 1. Enter new Employee details with designation & Reporting Manager. 2. Display all the Project Leaders (In a Grid) reporting to selected Project Managers (In a Combo box). 3. Display all the Engineers (In a Grid) reporting to selected Project Leader (In a Combo box). 4. Display all the Employees (In a Grid) with their reporting Manager (No Value for PM). NOTE: tbl_Designation is a static table containing the following Rows in it. 1 Project Manager 2 Project Leader 3 Engineer			
II. Consider the Database db_LSA (Lecturer Subject Allocation) consisting of the following tables:			

tbl_Subjects(IdSubject: int, SubjectCode: string, SubjectName: string)
tbl_Lecturers(IdLecturer: int, LecturerName: string, ContactNumber: string)
tbl_LecturerSubjects(IdSubject: int, SubjectCode: string, IdLecturer: int)
Develop a suitable window application using C#.NET having following options.

1. Enter new Subject Details.
2. Enter New Lecturer Details.
3. Subject Allocation with Lecturer Name in a Combo box and subjects to be allocated in Grid with checkbox Column.
4. Display all the subjects allocated (In a Grid) to the selected Lecturer (In a Combo Box).

III. Consider the database db_VSS (Vehicle Service Station) consisting of the following tables:

tbl_VehicleTypes(IdVehicleType: int, VehicleType: string, ServiceCharge: int)
tbl_ServiceDetails(IdService: int, VehicleNumber: string, ServiceDetails: string, IdVehicleType: int)

Develop a suitable window application using C#.NET having following options.

1. Enter new Service Details for the Selected Vehicle Type (In a Combo Box).
2. Update the Existing Service Charges to Database.
3. Total Service Charges Collected for the Selected Vehicle (In a Combo box) with total amount displayed in a text box.

NOTE: tbl_VehicleType is a static table containing the following Rows in it.

- 1 Two Wheeler 500
- 2 Four Wheeler 1000
- 3 Three Wheeler 700

IV. Develop a web application using C#.NET and ASP.NET for the Postal System Management. The master

page should contain the hyper links for adding Area Details, Postman details, Letter distributions and View Letters.

Consider the database db_PSM (Postal System Management) consisting of the following tables:

tbl_AreaDetails(IdArea: int, AreaName: string)
tbl_PostmanDetails(IdPostman: int, PostmanName: string, ContactNumber: string, IdArea: int)
tbl_AreaLetters(IdLetter: int, LetterAddress: string, IdArea: int)

Develop the suitable content pages for the above created 4 hyper links with the following details:

1. Enter New Area Details
2. Enter New Postman Details with the Area he/she is in-charge of (display Area in a Combo box)
3. Enter all the Letters distributed to the selected Area (display Area in a Combo box)
4. Display all the Letter addresses (In a Grid) to be distributed by the selected Postman (In a Combo box)

Course Outcomes: At the end of the course the student will be able to:	
24MCL304.1	Demonstrate command-line arguments in C# with understanding of input handling and basic arithmetic operations.
24MCL304.2	Implement boxing and unboxing operations in C#
24MCL304.3	Implement operator overloading in C# and apply them to user-defined data types.
24MCL304.4	Implement jagged arrays in C# with iteration techniques for multidimensional arrays.
24MCL304.5	Design and implement scalable and efficient database interactions using ADO.NET.
24MCL304.6	Develop ASP.NET web application by integrating databases within.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	.NET 4.0 Programming (6-in-1), Black Book. (Chapters: 1,10,11,12,13,14, 19 and 33).	Kogent Learning Solutions Inc.	Dream Tech Press	1 January 2011
2	C# 2010 for Programmers, (Chapters: 14,15,19 and 27.3)	Paul Deitel and Harvey Deitel	Pearson Education.	4th Edition, 2010
Reference Books				
1	Pro C# 5.0 and the .NET 4.5 Framework,	Andrew Trolsen	Apress	6th Edition, 2012
2	Pro ASP.NET Core 6 (E Book)	Adam Freeman	Apress	9th edition 25 February 2022

Additional Resources: Web links/NPTEL Courses

- <https://tinyurl.com/Learn-C-SHARP-Programming>
- <https://tinyurl.com/ASP-DOT-NET-CORE-WITH-ADO>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCL304.1	2	2	-	-	-	-	-	-
24MCL304.2	2	2	-	-	-	-	-	-
24MCL304.3	2	2	-	-	-	-	-	-
24MCL304.4	2	2	-	-	-	-	-	-
24MCL304.5	-	2		2	-	-	-	-
24MCL304.6	-	2	-	2	-	-	-	2

1: Low 2: Medium 3: High

Project Work			
Course Code	24MCP305	CIE Marks	50
Course Type (Theory/Practical/Integrated)		SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(0:0:22)	SEE	3 Hours
Total Hours		Credits	11
Course Learning Objectives: 1. To Identify different user requirements and perform feasibility analysis. 2. To develop innovative IT applications to meet industrial and societal needs 3. To adapt themselves to changing IT requirements through life-long learning 4. To exhibit leadership skills and advance in their chosen career. 5. To conduct testing of applications using appropriate techniques and tools. 6. To formulate the project findings.			
Project Guidelines			
1. The candidate should carry out the project in any industry or R&D organization or educational institution under a guide / co-guide. 2. This is an individual project to be carried out during 3rd Semester 3. The candidate has to present the work carried out before the examiners during the Semester End examination. 4. The work carried out should be free from plagiarism. 5. The literature study may be clearly written which may be the summary of existing work and highlight of what are the functionalities that are proposed to the project. 6. Students shall indicate the different research papers, documents referred to as a part of the literature study.			
General Rules			
1. Project work may be application/ testing or research oriented and accordingly the project report contents may vary. 2. Students are encouraged and appreciated to show their project code demo along with their power point slide show during their viva-voce exams as an added advantage.			

Course Outcomes: At the end of the course the student will be able to:	
24MCP305.1	Identify different user requirements and perform feasibility analysis.
24MCP305.2	Develop innovative IT applications to meet industrial and societal needs
24MCP305.3	Adapt themselves to changing IT requirements through life-long learning
24MCP305.4	Exhibit leadership skills and advance in their chosen career.
24MCP305.5	Conduct testing of applications using appropriate techniques and tools.
24MCP305.6	Formulate the project findings.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCP305.1	-	2	-	-	-	-	-	-
24MCP305.2	-	-	2	-	-	-	-	-
24MCP305.3	-	-	-	-	-	-	-	2
24MCP305.4	-	-	-	-	2	-	-	-
24MCP305.5	-	-	-	2	-	-	-	-
24MCP305.6	-	2	-	-	-	-	-	-

1: Low 2: Medium 3: High

FOURTH SEMESTER

MOOCs (Online Courses 16 Weeks duration)			
Course Code	24AEC401	CIE Marks	
Course Type (Theory/Practical/Integrated)		SEE Marks	
		Total Marks	100
Teaching Hours/Week (L:T:P)	(0:0:0)	SEE	
Total Hours		Credits	04
Course Learning Objectives: 1. To provide open access to high quality education content and information 2. To promote self-learning approach 3. To provide an opportunity to enhance problem solving skills 4. To develop interdisciplinary learning approaches 5. To recognize the new technologies in their area of interest 6. To formulate the MOOC studies for lifelong learning.			
Any MOOC topic (Choices are given by the Department) with minimum 16 weeks to be completed between I Sem to IV Sem)			

Course Outcomes: At the end of the course the student will be able to:	
24AEC401.1	Get exposure to high quality education content and information
24AEC401.2	Inculcate self-learning approach
24AEC401.3	Choose courses to enhance problem solving skills
24AEC401.4	Develop interdisciplinary learning approaches
24AEC401.5	Recognize the new technologies in their area of interest
24AEC401.6	Formulate the MOOC studies for lifelong learning

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24AEC401.1	2	2	2	2	-	-	-	3
24AEC401.2	-	-	2	-	2	-	-	-
24AEC401.3	-	-	2	-	-	-	-	2
24AEC401.4	-	-	-	2	2	-	-	2
24AEC401.5	-	2	-	2	-	-	-	2
24AEC401.6	2	-	-	-	-	-	-	2

1: Low 2: Medium 3: High

Technical Seminar			
Course Code	24MCS402	CIE Marks	100
Course Type (Theory/Practical/Integrated)		SEE Marks	
		Total Marks	100
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE	
Total Hours		Credits	02
Course Learning Objectives: 1. To acquire knowledge on advanced technologies 2. To read and understand technical papers 3. To improve effective oral communication 4. Compare the current Technology trends 5. To enhance innovative approaches 6. To improve research aspects			
The CIE marks awarded for Technical Seminar shall be based on the evaluation of Seminar Report, Presentation skills and performance in Question and Answer session in the ratio 50:25:25. Seminar presentation and report have to be evaluated using rubrics.			

Course Outcomes: At the end of the course the student will be able to:	
24MCS402.1	Analyze relevant topic in computing sciences and make valid conclusions on industry/society/environment using fundamental/ research-based knowledge.
24MCS402.2	Demonstrate the basic concepts and ideas presented in technical papers
24MCS402.3	Demonstrate self-learning by making effective presentation and report writing.
24MCS402.4	Differentiate technology trends in the selected area.
24MCS402.5	Apply innovative approaches in articulation of presentation or technical / research document
24MCS402.6	Develop a technical or research article

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24MCS402.1	-	2	-	-	-	-	-	-
24MCS402.2	-	2	-	-	-	-	-	-
24MCS402.3	-	-	-	-	-	-	2	-
24MCS402.4	-	2	-	-	-	-	-	-
24MCS402.5	-	-	-	-	-	-	-	-
24MCS402.6	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Industry Internship			
Course Code	24INT403	CIE Marks	50
Course Type (Theory/Practical/Integrated)		SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(0:0:0)	SEE	3 Hours
Total Hours		Credits	10
Course Learning Objectives: 1. To sketch out different project development needs. 2. To build interpersonal skills to improve the industry- academia culture. 3. To improve self-learning 4. To develop innovative IT applications to meet industrial and societal needs 5. To adapt themselves to changing IT requirements through life-long learning 6. To exhibit leadership skills and advance in their chosen career			
Guidelines for Industry Internship: • The students shall undergo internship in the industry for a period of 12 weeks • The internship shall be carried out in industry / R&D labs or institutions. • The students shall submit the monthly report and required to attend the periodic evaluation as per the calendar. • Internship should be presented along with the report by the end of 12 weeks and shall be evaluated by the internal panel for 100 marks. • The student shall prepare a report and submit the same to the guide allotted by the institute. The student shall present the progress of the internship to the panel of members constituted by the Head of the Department (HoD), Internship Coordinator and the Guide.			

Course Outcomes: At the end of the course the student will be able to:	
24INT403.1	Sketch out different project development needs.
24INT403.2	Build interpersonal skills to improve the industry- academia culture.
24INT403.3	Exhibit leadership skills and advance in their chosen career
24INT403.4	Analyze the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
24INT403.5	Develop applications using modern tools and technologies.
24INT403.6	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
24INT403.1	-	2	-	-	-	-	-	-
24INT403.2	-	-	-	-	-	-	-	-
24INT403.3	-	-	-	-	-	-	-	2
24INT403.4	-	-	-	-	-	2	-	-
24INT403.5	-	-	-	-	2	-	-	-
24INT403.6	-	-	-	-	-	-	2	-

1: Low 2: Medium 3: High

Core Values of the Institution

SERVICE

A Josephite will keep service as the prime goal in everything that is undertaken. Meeting the needs of the stakeholders will be the prime focus of all our endeavors.

EXCELLENCE

A Josephite will not only endeavor to serve, but serve with excellence. Preparing rigorously to excel in whatever we do will be our hallmark.

ACCOUNTABILITY

Every member of the SJEC Family will be guided to deliver on assurances given within the constraints set. A Josephite will always keep budgets and deadlines in mind when delivering a service.

CONTINUOUS ADAPTATION

Every member of the SJEC Family will strive to provide reliable and continuous service by adapting to the changing environment.

COLLABORATION

A Josephite will always seek to collaborate with others and be a team-player in the service of the stakeholders.

Objectives

- Provide Quality Technical Education facilities to every student admitted to the College and facilitate the development of all round personality of the students.
- Provide most competent staff and excellent support facilities like laboratory, library and internet required for good education on a continuous basis.
- Encourage organizing and participation of staff and students in in-house and outside Training programmes, seminars, conferences and workshops on continuous basis.
- Provide incentives and encouragement to motivate staff and students to actively involve in research-innovative projects in collaboration with industry and R & D centres on continuous basis
- Invite more and more number of persons from industry from India and abroad for collaboration and promote Industry-Institute Partnership.
- Encourage consultancy and testing and respond to the needs of the immediate neighbourhood.



St Joseph Engineering College

AN AUTONOMOUS INSTITUTION

Affiliated to VTU, Belagavi | Recognised by AICTE, New Delhi

Accredited by NAAC with A+ Grade

B.E. (ECE, EEE, ME, CIV), MBA & MCA Accredited by NBA, New Delhi

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