MCA

SCHEME & SYLLABUS 2023

(2nd Year MCA)

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

MCA – II Year
SYLLABUS – 2023

Program Outcomes

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													
SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	PCC	23MCA301	Advances in Web Technologies	MCA	MCA	04	-	-	03	50	50	100	04
2	PCC	23MCA302	Programming using C#.NET	MCA	MCA	04	-	-	03	50	50	100	04
3	PCC	23MCA303	Computer Networks	MCA	MCA	04	-	-	03	50	50	100	04
4	PEC	23MC304X	Elective-III	MCA	MCA	03	-	-	03	50	50	100	03
5	PEC	23MC305X	Elective-IV	MCA	MCA	03	-	-	03	50	50	100	03
6	PCC	23MCL306	Advances in Web Technologies Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
7	PCC	23MCL307	Programming using C#.NET Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
8	PCC	23MCL308	Computer Network Laboratory	MCA	MCA	01	-	02	03	50	50	100	02
9	INT	23INT309	Summer Internship - I							50	50	100	03
Total						**21**	**00**	**06**	**24**	**450**	**450**	**900**	**27**

Elective III		Elective IV	
23MC304A	Blockchain Technology	23MC305A	Deep Learning
23MC304B	Cloud Computing	23MC305B	Big Data Analytics
23MC304C	Digital Marketing	23MC305C	Internet of Things
23MC304D	Introduction to Drone Technologies	23MC305D	Cryptography and Network Security
23MC304E	NoSQL	23MC305E	Salesforce Administrator

Summer Internship: All the students admitted shall have to undergo a mandatory summer internship of minimum 04 weeks during II and III semester vacation. Summer Internship shall include Inter / Intra Institutional activities. Internship examination shall be conducted during III semesters and the prescribed credit shall be included in III semesters. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent examination after satisfying the internship requirements.

IV Semester MCA													
SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	SDC	23AEC401	MOOC	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	23MCP402	Project Work	MCA	MCA	-	-	-	02	50	50	100	07
3	INT	23INT403	Industry Internship for 12 weeks			-	-	-	03	50	50	100	09
Total						**00**	**00**	**00**	**05**	**100**	**100**	**300**	**20**

Note: PCC: Professional Core Course; PEC = Professional Elective Course; BSC: Basic Science Course SDC = Skill Development Course; INT =Internship	
Definition of Credit:	One-hour Lecture (L) per week per semester = 1 Credit Two-hour Tutorial (T) per week per semester = 1 Credit Two-hour Practical/Laboratory/Drawing (P) per week per semester = 1 Credit Four hours of Self-study = 1 Credit

Sl. No.	Course Area	I	II	III	IV
1.	BSC	3	-	-	-
2.	PCC	22	21	18	-
3.	PEC	-	6	6	-
4.	SDC	-	1	-	11
5.	INT	-	-	3	9
Total		**25**	**28**	**27**	**20**

ADVANCES IN WEB TECHNOLOGIES

Course Code	**23MCA301**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. Implement Tailwind CSS and Bootstrap in web Pages.
2. Design Web Pages using React basics.
3. Design programs using Advanced React
4. Understand the basics of Node.js
5. Apply content management tools to develop web application

Module-1 Tailwind CSS and Bootstrap **10Hrs**

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. Introduction to Bootstrap, Grid System, Bootstrap components- Buttons, Modals, Alerts, Cards, Forms. Comparison of tailwind CSS and bootstrap. Introduction to twitter bootstrap.

Module-2 React Basics **10Hrs**

The Overview of React and Javascript fundamentals. React installation and setup. Hello World: Hello React World, React.createElement(), JSX, Setup Babel. The Life of a Component: A Custom Function Component, A Custom Class Component,Properties, State, A textarea Component, Make It Stateful.

Module-3 Advanced React and Introduction to Material UI **10Hrs**

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. Introduction to Material UI, material UI Components- Buttons, icons, Text Fields, Grid, Box, Containers. Understanding Material UI's Grid System.

Module-4 Introduction to Node.js **10Hrs**

Welcome to Node.js: Built on JavaScript, Asynchronous and evented, DIRTy applications, DIRTyby default. Working with npm (Node Package Manager). Introduction to Express.js: Creating an HTTP Server, Creating routes. Fetching Data: Fetch API: Introduction to Fetch, Making GET and POST requests using fetch. Handling responses and errors.

Module-5 Search Engine and Web Content Management System **10Hrs**

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.

Course Outcomes: At the end of the course the student will be able to:	
23MCA301.1	Develop and maintain clean, efficient, and scalable CSS codebases using Tailwind CSS and Bootstrap.
23MCA301.2	Design pages using react.
23MCA301.3	Apply the concepts of React to create Components and design applications using the Lifecycle method.
23MCA301.4	Build applications using Node.js.
23MCA301.5	Develop Strategies to improve website visibility, content management, optimize web pages for search rankings and familiarize themselves with key features of CMS.
23MCA301.6	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 2021
2	Node.js in Action	Mike Cantelon, Marc Harter, T.J. Holowaychuk, and Nathan Rajlich	Manning Publications	1st Edition 2014
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	-	2017
2	Beginning Node.js, Express & MongoDB Development	Greg Lim	Greg Lim	2020
3	Drupal 8 Development Cookbook	Matt Butcher and others	Packt	2017
4	Modern CSS with Tailwind: flexible styling without the fuss	Noel Rappin	programmatic bookshelf	2021

Web Links:

https://tailwindcss.com/
https://ui.shadcn.com/
https://www.youtube.com/watch?v=v0_AT8zaLo8
https://www.youtube.com/watch?v=lCxcTsOHrjo&t=1874s
https://mui.com/material-ui/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA301.1			2	2	2			
23MCA301.2		1		2	2			
23MCA301.3			2	2	2			
23MCA301.4					1			
23MCA301.5					1			
23MCA301.6		2		1				

PROGRAMMING USING C#.NET

Course Code	**23MCA302**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1: To Analyze C# and client-server concepts using .Net FrameWork 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 **10 Hrs**

Getting started with .NET Framework 4.0 and C#, 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. Namespaces, The System namespace, .NET Array Types. Object Oriented Programming: Classes and Objects: Creating a Class, Creating an Object, Using this Keyword.

Module-2 **10 Hrs**

Object Oriented Programming: Creating an Array of Objects, Using the Nested Classes, Defining Partial Classes and Method, Returning a Value from a Method and Describing Access Modifiers. Static Classes and Static Members, Properties: Read-only Property, Static Property, Indexers, Structs: Syntax of a struct and Access Modifiers for structs, System. Object Class Encapsulation: Encapsulation using accessors and mutators, Encapsulation using Properties. Inheritance: Inheritance and Constructors, Sealed Classes and Sealed Methods, Extension methods. Polymorphism: Compile time Polymorphism/ Overloading, Runtime Polymorphism/ Overriding. Abstraction: Abstract classes, Abstract methods. Interfaces: Syntax of Interfaces, Implementation of Interfaces and Inheritance.

Module-3 **10 Hrs**

Delegates, Events, Exception Handling and ADO.NET Delegates: Creating and using Delegates, Multicasting with Delegates. Events: Event Sources, Event Handlers, Events and Delegates, Multiple Event Handlers. 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, OLEDB Database, ODBC Data Source. Creating a Command Object. Working with DataAdapters: Creating DataSet from

DataAdapter.
Module-4 **10 Hrs**
Graphical User Interface with Windows Forms and WPF 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. WPF: New WPF Controls, WPF Architecture: Presentation Framework, Presentation Core, WindowsBase, MIL or Milcore, Working with WPF Windows.
Module-5 **10 Hrs**
Web App Development and Data Access using ADO.NET: 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, AJAX and other Technologies, AJAX Server Controls, Script Manager control, Update Panel, Update Progress Control, Creating Simple Application using AJAX Server Controls.

Course Outcomes: At the end of the course the student will be able to:	
23MCA302.1	Analyze C# and client-server concepts using .Net FrameWork Components.
23MCA302.2	Implement object oriented concepts using C#.NET
23MCA302.3	Design user interfaces for web applications using WinForms
23MCA302.4	Apply delegates, event and exception handling to incorporate with WinForm, and ADO.NET.
23MCA302.5	Analyze the use of .Net Components depending on the problem statement.
23MCA302.6	Demonstrate a web application 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:	Kogent Learning Solutions Inc.	Dream Tech Press	2nd edition, Updated for

	1,10,11,12,13,14 and 19).			Python 3,2016
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	C# 4.0 Unleashed,	Bart De Smet	Pearson Education-SAMS Series.	2011
3	Complete Reference C# 4.0	Herbert Schildt	Tata McGraw Hill	2010

Web links/Video Lectures/MOOCs

- https://www.udemy.com/course/learn-c-sharp-programming-in-ten-easy-steps/
- https://www.youtube.com/watch?v=aoFDyt8oG0k

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCA302.1	2	2						
23MCA302.2	2	2						
23MCA302.3	2	2		3				
23MCA302.4	2	2		3				
23MCA302.5		2						2
23MCA302.6		2		2				2

1: Low 2: Medium 3: High

COMPUTER NETWORKS			
Course Code	**23MCA303**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	(4:0:0)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1: To provide an introduction to the OSI and TCP/IP layers.
2 : To gain an understanding of the roles of data link control protocols.
3 : To develop the ability to explain the network layers working principles.
4 : To provide a comprehensive introduction to analyze the transport layer functionalities.
5. To familiarize various network security and applications.
6. To Analyze the basic error detection techniques and reliable transmission.

Module-1 **8Hrs**

Applications, Requirements, Network Architecture, Implementing Network Software, Performance.

Module-2 **8Hrs**

Perspectives on Connecting, Encoding (NRZ, NRZI, Manchester, 4B/5B), Framing, Error Detection, Reliable Transmission, Ethernet and Multiple Access Networks (802.3), Wireless(802.11/Wi-Fi, Bluetooth(802.15.1), cellphone technologies.

Module-3 **8Hrs**

Internetworking and Advanced Internetworking Switching and Bridging, Basic Internetworking (IP), Routing, The Global Internet, Routing among Mobile Devices.

Module-4 **8Hrs**

End-to-End Protocols and Congestion Control Simple Demultiplexer (UDP), Reliable Byte Stream (TCP), Queuing Disciplines, TCP Congestion Control, Congestion-Avoidance Mechanisms.

Module-5 **8Hrs**

Network Security and Applications
Cryptographic Building Blocks, Key Pre-distribution, Firewalls, Traditional Applications, Infrastructure Services.

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

23MCA303.1	Apply the basic concepts of networking and to analyze different parameters such as

	bandwidth, delay, throughput of the networks for the given problem.
23MCA303.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication
23MCA303.3	Analyze the networking concepts of TCP/IP for wired and wireless components
23MCA303.4	Identify the issues of Transport layer to analyze the congestion control mechanism
23MCA303.5	Design network topology with different protocols and analyze the performance
23MCA303.6	Analyze the basic error detection techniques and reliable transmission.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Computer Networks A Systems Approach (1, 2 ,3.1,3.2,3.3, 3.4,4.1, 5.1,5.2,6.2,6.36.4, 8.1,8.2,8.5, 9.1,9.3)	Larry L Peterson and Bruce S Davie	Morgan Kaufmann Publishers	5th Edition, 2012.
Reference Books				
1	Computer Networking – A Top-Down Approach Featuring the Internet	James F. Kurose, Keith W. Ross	Pearson Education	Fifth Edition, 2009.
2	Computer and Communication Networks	Nader. F. Mir	Pearson Prentice Hall Publishers	Second Edition, 2010.
3	Computer Networks: An Open Source Approach	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	McGraw Hill Publisher	2012.
4	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw – Hill	Fourth Edition, 2011.

Web links/Video Lectures/MOOCs/papers

1. https://www.coursera.org/learn/computer-networking
2. https://www.coursera.org/specializations/computer communications

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO 8**
23MCA303.1	2				2			
23MCA303.2		2					2	
23MCA303.3			2			2		
23MCA303.4		2			2			
23MCA303.5	2				2			
23MCA303.6		2					2	

1: Low 2: Medium 3: High

BLOCKCHAIN TECHNOLOGY			
Course Code	**23MC304A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To demonstrate the basics of Blockchain concepts using modern tools/technologies.
2. To analyze the role of blockchain applications in different domains including cybersecurity.
3. To evaluate the usage of Blockchain implementation/features for the given problem.
4. To exemplify the usage of bitcoins and its impact on the economy.
5. To analyze the application of specific block chain architecture for a given problem
6. To demonstrate the working principles of bitcoin

Module-1	**8Hrs**
Introduction to Blockchain, How Blockchain works, Blockchain vsBitcoin, Practical applications, public and private key basics, pros and cons of Blockchain, Myths about Bitcoin	
Module-2	**8Hrs**
Blockchain :Architecture , versions ,variants , use cases, Life use cases of blockchain, Blockchain shared Database, Introduction to crypto currencies, Types, Applications.	
Module-3	**8Hrs**
Concept of Double Spending, Hashing, Mining, Proof of work. Introduction to Merkel tree, Privacy , payment verification , Resolving Conflicts , Creation of Blocks	
Module-4	**8Hrs**
Introduction to Bitcoin, key concepts of Bitcoin, Merits and De Merits Fork and Segwits, Sending and Receiving bitcoins, choosing bitcoin wallet, Converting Bitcoins to Fiat Currency.	
Module-5	**8Hrs**
Introduction to Ethereum, Advantages and Disadvantages, Ethereumvs Bitcoin, Introduction to Smart contracts, usage, application, working principle, Law and Regulations. Case Study	

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

23MC304A.1	Demonstrate the basics of Block chain concepts using modern tools/technologies.

23MC304A.2	Analyze the role of block chain applications in different domains including cyber security.
23MC304A.3	Evaluate the usage of Block chain implementation/features for the given problem
23MC304A.4	Demonstrate the usage of bitcoins and its impact on the economy.
23MC304A.5	Analyze the application of specific block chain architecture for a given problem
23MC304A.6	Demonstrate the working principles of bitcoin

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions.	Arshdeep Bikramaditya Signal, Gautam Dhameja (PriyansuSekharPanda.,	APress	1st Edition 2018
2	Blockchain Applications: A Hands-On Approach	Bahga, Vijay Madisetti	Published By Arshadeep Bahga & Vijay Madisetti	1st Edition 2017
3	Blockchain	Melanie Swan,	OReilly	1st edition, 2015
Reference Books				
1	Bitcoin and Cryptocurrency Technologies	Aravind Narayan. Joseph Bonneau, princton	O'Reilly	4th edition, 2010
2	Bitcoin and Blockchain Basics: A non-technical introduction for beginners	Arthu.T Brooks.	Arthu.T Brooks	1st edition 2019

Web links/Video Lectures/MOOCs

1. https://www.coursera.org/specializations/blockchain
2. https://www.coursera.org/specializations/uci-blockchain

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304A.1	2			2				
23MC304A.2		2					2	
23MC304A.3		2	2	2				
23MC304A.4		2						2
23MC304A.5	2	2						
23MC304A.6							2	2

1: Low 2: Medium 3: High

CLOUD COMPUTING			
Course Code	**23MC304B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Understand the Fundamentals of Cloud Computing
2. Analyze Cloud Computing Architectures
3. Apply Virtualization Techniques
4. Explore Advanced Topics in Cloud Computing
5. Utilize Cloud Tools and Applications
6. Critical Evaluation of Cloud Computing Technologies and Their Applications

Module-1 **8Hrs**

Introduction to Cloud Computing: Eras of computing, Virtualization, Web 2.0, Service oriented computing vs Utility oriented computing, The vision of Cloud Computing, Parallel Vs Distributed computing, Technologies for distributed computing.

Module-2 **8Hrs**

Cloud computing architecture : Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.

Module-3 **8Hrs**

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples:Xen: Para virtualization, VmWare: Full virtualization.

Module-4 **8Hrs**

Advanced Topics in Cloud Computing: Market-oriented cloud computing definition, Energy efficiency in clouds, Energy-efficient and green cloud computing architecture, Energy-aware dynamic resource allocation, InterClouds and integrated allocation of resources.

Module-5 **8Hrs**

Cloud Tools and Applications: Aneka PaaS; Open stack: Introduction to open stack; Components of open stack; Amazon web services; Google AppEngine; Microsoft Azure; Scientific applications: Healthcare; Biology; Geo-Science, Business and Consumer applications:

ARM & ERP; Productivity; Social networking.

Course Outcomes: At the end of the course the student will be able to:	
23MC304B.1	Demonstrate the Fundamentals of Cloud Computing
23MC304B.2	Analyze Cloud Computing Architectures
23MC304B.3	Apply Virtualization Techniques
23MC304B.4	Discover Advanced Topics in Cloud Computing
23MC304B.5	Use Cloud Tools in designing applications
23MC304B.6	Invent of Cloud Computing Technologies and Their Applications

Sl. No.	**Title of the Book**	**Name of the Author/s**	Name of the Publisher	Edition and Year
Textbooks				
1	Mastering Cloud Computing	Rjkumar Buyya, Christian Vecchiola, and Thamarai Selci,	Tata McGraw Hill, New Delhi, India	Illustrated edition 2013.
Reference Books				
1	Cloud Computing for Dummies	Judith Hurwitz, R.Bloor, M. Kanfman, F.Halper	Wiley India Edition	2nd Edition 2020
2	Cloud Computing: A Practical Approach	Vette, Toby J. Vette, Robert Elsenpeter	Tata McGraw Hill	Ist Edition 2010

Course Links:
1. https://www.edx.org/learn/cloud-computing 2.https://www.ibm.com/training/cloud/home

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304B.1	2	2						
23MC304B.2	2	2			1			
23MC304B.3		2	2		2			
23MC304B.4				2	2	2		
23MC304B.5			2		2			
23MC304B.6		2	2	2				

1: Low 2: Medium 3: High

DIGITAL MARKETING

Course Code	**23MC304C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To interpret key concepts related to e-marketing for any given case.
2. To identify the importance of conversion and working with digital relationship marketing.
3. To demonstrate the use of electronic media for designing marketing activities.
4. To examine the role of the search engine in improving digital marketing.
5. To execute social media marketing for a given scenario.
6. To test technical solutions to overcome social media threats.

Module-1 **8Hrs**

Introduction to Digital Marketing Evolution of Digital Marketing from traditional to modern era, Role of Internet; Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.

Module-2 **8Hrs**

Internet Marketing and Digital Marketing Mix – Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix, Impact of digital channels on IMC; Search Engine Advertising: - Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation Display marketing: - Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing.

Module-3 **8Hrs**

Social Media Marketing – Role of Influencer Marketing, Tools & Plan– Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy, Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools, Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting Twitter(officially rebranded to X) Marketing: - Introduction to Twitter(officially rebranded to X) Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter(officially rebranded to X) Advertising Campaigns Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat, Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics.

Module-4 **8Hrs**

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising -

Introduction and need for SEO, How to use internet & search engines; Search engine and its working pattern, On-page and off-page optimization, SEO Tactics - Introduction to SEM Web Analytics: - Google Analytics & Google Ads; data collection for web analytics, multi-channel attribution, Universal analytics, Tracking code Trends in digital advertising.
Module-5 **8Hrs**
Social Media Channels:- Introduction, Key terms and concepts, Traditional media vs Social media. Social media channels:- Social networking. Content creation, Bookmarking & aggregating and Location & social media. Tracking social media campaigns. Social media marketing:- Rules of engagement. Advantages and challenges. Social Media Strategy:- Introduction, Key terms and concepts. Using social media to solve business challenges. Step-by-step guide to creating a social media strategy. Documents and processes. Dealing with opportunities and threats. Step-by-step guide for recovering from an online brand attack. Social media risks and challenges.

Course Outcomes: At the end of the course the student will be able to:	
23MC304C.1	Demonstrate the key concepts related to e-marketing for the given case.
23MC304C.2	Analyze the importance of conversion and working with digital relationship marketing.
23MC304C.3	Demonstrate the use of different electronic media for designing marketing activities.
23MC304C.4	Analyze the role of search engine in improving digital marketing.
23MC304C.5	Analyze the role of social media marketing for the given problem.
23MC304C.6	Analyze technical solutions to overcome social media threats.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Digital Marketing	Seema Gupta	Mc-Graw Hill	1st Edition – 2017
Reference Books				
1	The Art of Digital Marketing	Ian Dodson	Wiley Latest Edition	2nd edition, Updated for Python 3,2016

2	Fundamentals of Digital Marketing	Puneet Singh Bhatia	Pearson	23st Edition – 2017
3	Digital Social Media Marketing	Prof. Nitin C. Kamat, Mr.Chinmay	Himalaya Publishing House Pvt. Ltd.	1st Edition 2017

Web links/Video Lectures/MOOCs

1. https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital-marketing.pdf
2. https://mailchimp.com/marketing-glossary/digital-marketing/

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
23MC304C.1	1				2			
23MC304C.2	2			1				
23MC304C.3			2		2			
23MC304C.4				2	2			
23MC304C.5			2		2			
23MC304C.6				3	2			

1: Low 2: Medium 3: High

INTRODUCTION TO DRONE TECHNOLOGIES

Course Code	**23MC304D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To discuss the basic principles of software testing.
2. To recognize the perceptions on testing with related examples.
3. To interpret the various types of testing.
4. To analyze the difference between functional testing and structural testing.
5. To analyze the performance of fault based testing.
6. To evaluate different testing tools.

Module-1 **8Hrs**

Overview of Drone Technologies

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

Module-2 **8Hrs**

Drone Flight Principles

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.

Module-3 **8Hrs**

Drone Navigation and Control

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

Module-4 **8Hrs**

Drone Maintenance and Repairs

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.

Module-5 **8Hrs**

Advanced Applications and Future Trends

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.

Mini Project

Course Outcomes:

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

23MC304D.1	Discuss the basic principles of software testing with related examples.
23MC304D.2	Recognize the perceptions on testing
23MC304D.3	Interpret the various types of testing.
23MC304D.4	Analyze the difference between functional testing and structural testing.
23MC304D.5	Analyze the performance of fault based testing.
23MC304D.6	Evaluate different testing tools.

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	2nd Edition 2014
2	Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs	John Baichtal	Que Publishers	2nd Edition 2015
3	Drones For Dummies	Mark LaFay	For Dummies	1st Edition, 2015

Web links/Video Lectures/MOOCs

1. https://www.udemy.com/course/certified-tester-foundation-level-
2. https://onlinecourses.nptel.ac.in/noc19_cs71/preview
3. https://www.coursera.org/courses?query=software%20testing

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304D.1	2							
23MC304D.2		2						
23MC304D.3		2						
23MC304D.4				1				
23MC304D.5		2						
23MC304D.6					2			

1: Low 2: Medium 3: High

NOSQL			
Course Code	**23MC304E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To demonstrate the basic concepts of unstructured data.
2. To contrast and Manage the Data using CRUD operations.
3. To analyze the NoSQL data architecture patterns
4. To develop the applications using NoSQL
5. To realize the concept of Map Reduce and its applicability in the real world application development.
6. To examine the framework of NOSQL

Module-1	**8Hrs**
Introduction to NoSQL, Definition of NoSQL, History of NoSQL and Different types of NoSQL . Exploring NoSQL: CRUD operations with Mongo DB, Querying, Modifying and Managing. Interfacing and Interacting with NoSQL.	
Module-2	**8Hrs**
NoSQL Basics: NoSQL Storage Architecture: Distributed storage systems, Storage engines ,Consistency models, Scalability features and storage optimization techniques. Exploring Mongo DB Java/Ruby/Python, Data Storage in NoSQL: NoSQL Data Stores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra)	
Module-3	**8Hrs**
Advanced NoSQL, NoSQL in Cloud, Parallel Processing with Map Reduce, Big Data with Hive	
Module-4	**8Hrs**
Working with NoSQL, Surveying Database Internals, Migrating from RDBMS to NoSQL, Web Frameworks and NoSQL, using MySQL as a NoSQL.	
Module-5	**8Hrs**
Developing Web Application with NOSQL and NOSQL Administration Php and MongoDB, Python and MongoDB, Creating Blog Application with PHP.	

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

23MC304E.1	Demonstrate the concepts of unstructured data.
23MC304E.2	Analyze and manage Data using CRUD operations
23MC304E.3	Describe the NoSQL data architecture patterns
23MC304E.4	Develop the applications using NoSQL
23MC304E.5	Realize the concept of Map Reduce and its applicability in the real world application development
23MC304E.6	Analyze the framework of NOSQL

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Professional NOSQL	Shashank Tiwari	John Wiley & Sons, Inc.	1st Edition 2011
2	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence.	Pramod J. Sadalage, Martin Fowler	Addison-Wesley.	1st Edition 2012
Reference Books				
1	The Definitive Guide to Mongo DB, The NOSQL Database for cloud and Desktop Computing	EelcoPlugge, Peter Membreyand Tim Hawkins	APress	1st Edition 2010

Web links/Video Lectures/MOOCs

1. https://www.guru99.com/nosql-tutorial.html
2. https://www.javatpoint.com/nosql-databases
3. https://www.geeksforgeeks.org/introduction-to-nosql/

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC304E.1				2				
23MC304E.2	2			2				
23MC304E.3				2				
23MC304E.4			2	2				2
23MC304E.5				2				2
23MC304E.6		2	2					

1: Low 2: Medium 3: High

DEEP LEARNING

Course Code	**23MC305A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To discuss the basics of deep learning for a given context.
2. To introduce neural network concepts
3. To implement various deep learning models for the given problem
4. To organize high dimensional data using reduction techniques for the given problem
5. To analyze optimization and generalization techniques of deep learning for the given problem.
6. To appraise the given deep learning application and enhance by applying latest techniques for libraries and packages

Module-1 **8Hrs**

Introduction to machine learning- Linear models (SVM and Perceptron, logistic regression)- Introduction to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates

Module-2 **8Hrs**

DEEP NETWORKS : History of Deep Learning- A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi- supervised Learning

Module-3 **8Hrs**

DIMENSIONALITY REDUCTION AND NEURAL NETWORKS: Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

Module-4 **8Hrs**

OPTIMIZATION AND GENERALIZATION 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.

Module-5 **8Hrs**

CASE STUDY AND APPLICATIONS Imagenet- Detection-Audio Wave Net-Natural Language Processing Word2Vec - Joint Detection BioInformatics- Face Recognition-

Scene Understanding- Gathering Image Captions

Course Outcomes: At the end of the course the student will be able to:	
23MC305A.1	Demonstrate the basics of deep learning for a given context.
23MC305A.2	Demonstrate neural network concepts
23MC305A.3	Implement various deep learning models for the given problem
23MC305A.4	Formulate high dimensional data using reduction techniques for the given problem
23MC305A.5	Analyze optimization and generalization techniques of deep learning for the given problem.
23MC305A.6	Evaluate the given deep learning application and enhance it by applying the latest techniques.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Advanced Data Analysis from an Elementary Point of View	CosmaRohilla Shalizi	Cambridge University Press	2015
Reference Books				
1	Deep Learning: Methods and Applications	Deng & Yu	Now Publishers	2013.
2	Deep Learning	Ian Goodfellow,Yoshua Bengio, Aaron Courville	MIT Press,	2016.
3	Neural Networks and Deep Learning	Michael Nielsen	Determination Press.	2015.

Web links/Video Lectures/MOOCs

1. https://www.coursera.org/learn/introduction-to-deep-learning-boulder
2. https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-deep-learning
3. https://www.youtube.com/watch?v=VyWAvY2CF9c

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305A.1	3							2
23MC305A.2	3			2				
23MC305A.3			2	2				
23MC305A.4	2	2						2
23MC305A.5		2		2				2
23MC305A.6								

1: Low 2: Medium 3: High

BIG DATA ANALYTICS			
Course Code	**23MC305B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To gain knowledge on the basic principles of Big Data and Analytics.
2. To demonstrate various technologies for handling large volumes of data.
3. To describe 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 **8Hrs**

Big Data and Analytics
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, Standardizing Data Labels, Categorization

Module-2 **8Hrs**

Big Data Technology
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, Inter- and Trans-Firewall Analytics.

Module-3 **8Hrs**

Meet Hadoop
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.

Module-4 **8Hrs**

The Hadoop Distributed File system
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, Parallel Copying with distcp Keeping an HDFS Cluster Balanced, Hadoop Archives.

Module-5 **8Hrs**

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, Combining Resources, Variable Expansion, The Map Reduce Web UI

Course Outcomes: At the end of the course the student will be able to:	
23MC305B.1	Explain the basic principles of Big Data and Analytics.
23MC305B.2	Describe various technologies for handling large volumes of data.
23MC305B.3	Describe Hadoop ecosystem.
23MC305B.4	Illustrate the architecture of HDFS and explain functioning of HDFS clusters.
23MC305B.5	Analyze the usage of Map-Reduce techniques for solving big data problems.
23MC305B.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	2nd 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	1st Edition, 2013
3	Hadoop: The Definitive Guide	Tom White	O'reilly	3rd 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,	Ist edition 2012
3	Big Data Analytics with R and Haoop	Vignesh Prajapati	PACKT Publishing	Ist edition, 2013
4	Oracle Big Data Handbook	Tom Plunkett, Brian Macdonald.	Oracle Press	Ist edition, 2013

Web links/Video Lectures/MOOCs

1. https://youtu.be/bY6ZzQmtOzk
2. https://www.coursera.org/learn/foundations-big-data-analysis-sql
3. https://www.coursera.org/specializations/introduction-data-science

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305B.1	2	2						
23MC305B.2	2			2				2
23MC305B.3	2							2
23MC305B.4	2							2
23MC305B.5	2	2						
23MC305B.6	2	2		2				

1: Low 2: Medium 3: High

INTERNET OF THINGS			
Course Code	**23MC305C**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1: To realize the fundamentals of internet of things

2. To analyze the IoT architecture and design along with functional/compute stack and data management.

3: To apply IOT architecture for a given problem

4: To analyze the application protocol, transport layer methods for the given business case.

5: To analyze the application of data analytics for IOT for a given business case

6: To analyze the architecture and develop programming using modern tools for the given use case

Module-1 **8Hrs**

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

Module-2 **8Hrs**

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

Module-3 **8Hrs**

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

Module-4 **8Hrs**

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment 10.

Module-5 **8Hrs**

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Course Outcomes: At the end of the course the student will be able to:	
23MC305C.1	Realize the fundamentals of internet of things
23MC305C.2	Analyze the IoT architecture and design along with functional/compute stack and data management.
23MC305C.3	Apply IOT architecture for a given problem
23MC305C.4	Analyze the application protocol, transport layer methods for the given business case.
23MC305C.5	Analyze the application of data analytics for IOT for a given business case.
23MC305C.6	Analyze the architecture and develop programming using modern tools for the given use case

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	Pearson Education (Cisco Press Indian Reprint)	1st Edition. 2017
2	Internet of Things	Srinivasa K G	CENGAGE Learning India	1st Edition 2018
Reference Books				
1	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and ArshdeepBahga,	Orient Blackswan Private Limited	1st Edition, 2015

2	Internet of Things: Architecture and Design Principles	Raj Kamal	Tata McGraw Hill	1st Edition, 2017

Web links/Video Lectures/MOOCs/papers

1. https://www.coursera.org/specializations/iot
2. https://www.coursera.org/specializations/uiuc-iot

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)							
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
23MC305C.1	2	2	1					
23MC305C.2	2	2		2				
23MC305C.3	-	2	2		2			
23MC305C.4	-	2		2	2			
23MC305C.5	-		2	2	3			
23MC305C.6	2		2		2			

1: Low 2: Medium 3: High

CRYPTOGRAPHY AND NETWORK SECURITY			
Course Code	**23MC305D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. Implement encryption techniques for the given problem and analyze the results
2. Design the cipher technique and analyze the functioning of cipher for any given problem
3. Execute the public and private key-based cryptography algorithms and investigate the results of the algorithm based on the output
4. Construct the cryptographic algorithms using programming languages for any given problem
5. Develop security planning for the given case study with data classification, access control and propose a technical solution

Module-1 **8Hrs**

Introduction: OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, model for Network Security.
Classical Encryption Technique: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.

Module-2 **8Hrs**

Data Encryption and advanced encryption techniques:
Block Ciphers, Data Encryption Standard and Advanced Encryption Standard Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles and Modes of operation, Evaluation Criteria for AES, AES Cipher-Encryption and Decryption, Data Structure, Encryption Round.
Public Key Cryptography and Key Management:
Principles of Public Key Crypto system, RSA algorithm, Key management, Diffie Hellman Key exchange.

Module-3 **8Hrs**

Message Authentication and Hash Function: Authentication Requirement, Authentication Functions, Message Authentication Code, Hash Functions, Digital Signatures, Digital Signature Standard.
Authentication Applications: Kerberos, X.509 Authentication Service

Module-4 **8Hrs**

Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME
IP Security: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

Module-5	**8Hrs**
Web Security: Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET). **System Security**: Intruders, Intrusion Detection, Firewall Design Principles- Characteristics, Types of Firewall and Firewall Configuration.	

Course Outcomes: At the end of the course the student will be able to:	
23MC305D.1	Apply encryption techniques for the given problem and analyze the results.
23MC305D.2	Design the Cipher technique and analyze the functioning of Cipher for the given problem.
23MC305D.3	Implement the Public and Private key based cryptography algorithms and investigate the results of algorithms based on output.
23MC305D.4	Design and implement the cryptographic algorithms using programming languages/tools for the given problem/context.
23MC305D.5	Design the security planning for the given case study for data classification, access control and propose technical solutions, and submit the detailed report with plagiarism check.
23MC305D.6	Describe how to maintain the Confidentiality, Integrity and Availability of data.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Cryptography and Network Security – Principles and Practices	William Stallings	Pearson Education	4th Edition 2009.
Reference Books				
1	Cryptography and Network Security	Behrouz A. Forouzan and Debdeep Mukhopadhyay:	Tata McGraw-Hill	2nd Edition, 2010
2	Cryptography and Network Security	Atul Kahate	Tata McGraw-Hill	Third edition, 2007

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305D.1	3	2						
23MC305D.2		3	2	2				
23MC305D.3			2	2				
23MC305D.4			2	2				
23MC305D.5					2	2	2	
23MC305D.6							2	2

1: Low 2: Medium 3: High

INTRODUCTION SALESFORCE ADMINISTRATOR

Course Code	**23MC305E**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Summary of the Course:

A Salesforce Administrator solves business problems by customizing the Salesforce Platform. They build, configure, and automate technology solutions to deliver business value. Salesforce Administrators work with stakeholders to define system requirements and customize the platform. Most importantly, they enable users to get the most from Salesforce technology. A Salesforce Admin best understands how to make the platform work for their company's goals. Core responsibilities include supporting users, managing data, maintaining security standards, and delivering actionable analytics.

Course Learning Objectives:

1. Help in collaborating with business and technical stakeholders to design, configure, and implement Salesforce.
2. Develop a mindset in solving business problems using the Salesforce Platform.
3. Proactively set up processes to manage and protect customer and business data.
4. Hands on practice on provide reporting on a regular basis to help users and executives gain insights and make decisions from Salesforce data.
5. Learn how to create human-centered user experiences in Salesforce.
6. Understand how to Create, maintain, and enhance automated business processes.

Module-1 **8Hrs**

e Salesforce Platform Basics: Get Started with the Salesforce Platform, Discover Use Cases for the Platform, Understand the Salesforce Architecture, Navigate Setup, Power Up with AppExchange. Prepare Your Salesforce Org for Users : Set Up the Exchange Rate, Update the Exchange Rate with ACM, Customize the Home Page, Create a Unique Account List View, Create Chatter Groups User Management: Add New Users, Control What Your Users Can Access.

Customize an Org to Support a New Business Unit: Manage User Access, Manage Chatter, Modify Your Data Model, Configure an Email Letterhead and Template, Automate Your Business Process Identity Basics: Get to Know Salesforce Identity, Get To Know Your Salesforce Identity Users, Learn the Language of Identity

Module-2 **8Hrs**

Data Security: Overview of Data Security, Control Access to the Org, Control Access to Objects, Control Access to Fields, Control Access to Records, Create a Role Hierarchy, Define Sharing Rules.

Permission Set Groups: Get Started with Permission Set Groups, Create a Permission Set Group, Mute Permissions in Permission Set Groups Protect Your Data in Salesforce: Restrict Login Hours and IP Ranges, Create New Users and Allow a User to Delete

Accounts, Set Organization-Wide Defaults and Create a Role Hierarchy, Create Sharing Rules, Set Up Account Teams.

Protect Your Data in Salesforce: Restrict Login Hours and IP Ranges, Create New Users and Allow a User to Delete Accounts, Set Organization-Wide Defaults and Create a Role Hierarchy, Create Sharing Rules, Set Up Account Teams.

Data Modeling: Understand Custom & Standard Objects, Create Object Relationships, Work with Schema Builder.

Module-3 **8Hrs**

Lightning Experience Customization: Set Up Your Org, Create and Customize Lightning Apps, Create and Customize List Views, Customize Record Highlights with Compact Layouts, Customize Record Details with Page Layouts, Create Custom Buttons and Links, Empower Your Users with Quick Actions.

Customize a Salesforce Object: Work with Standard and Custom Fields, Create Picklists and Field Dependencies, Create Lookup Filters, Create Formula Fields, Create Record Types, Create Account Page Layouts, Enable Account Field History Tracking, Create Validation Rules.

Lightning App Builder: Get Started with the Lightning App Builder, Build a Custom Home Page for Lightning Experience, Build a Custom Record Page for Lightning Experience and Salesforce Mobile App, Build an App Home Lightning Page, Work with Custom Lightning Components.

Formulas and Validations: Use Formula Fields, Implement Roll-Up Summary Fields, Create Validation Rules

Module-4 **8Hrs**

Service Cloud for Lightning Experience: Begin Your Customer Service Journey, Administer Service Cloud, Automate Case Management, Create Digital Engagement on Multiple Channels.

Set Up the Service Console: Set Up the Lightning Service Console, Customize Your Lightning Service Console Pages, Add the Softphone Utility to Your App, Set Up Web Chats for Your Console.

Create a Process for Managing Support Cases: Create Support Processes, Create Record Types, Create an Escalation Rule Set Up Case Escalation and Entitlements: Create Support Processes, Create Case Queues and Assignment Rules, Create a Case Escalation Rule, Create an Automation with Flow Builder, Enable Entitlements and Set Up Service Contracts, Create an Entitlement Process, Create Service Contracts with Entitlements

Module-5 **8Hrs**

Reports & Dashboards for Lightning Experience: Introduction to Reports and Dashboards in Lightning Experience, Create Reports with the Report Builder, Format Reports, Visualize Your Data with the Lightning Dashboard Builder, Extend Your Reporting Strategy with AppExchange

Create Reports and Dashboards for Sales and Marketing Managers: Create Report and Dashboard Folders, Create a Simple Custom Report, Filter Your Reports, Group and Categorize Your Data, Use Summary Formulas in Your Reports, Manage Reported Data, Visualize Your Data

Approve Records with Approval Processes: Customize How Records Get Approved, Build an Approval Process Build a Discount Approval Process: Prepare Your Org, Create

an Approval Process, Create Initial Submission Actions, Specify Final Approval and Rejection Actions

Build a Simple Flow: Collect Contact Info from Your User, Check for a Matching Contact in Your Org, Branch the Flow, Create or Update a Contact Flow Builder Basics: Get Started with Automation, Go with the Flow, Meet Flow Builder,

Learn About Flow Variables

Course Outcomes:

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

23MC305E.1	Understand how to manage changes to business processes, technology, and people with Salesforce.
23MC305E.2	Improve the efficiency of business operations by proactively undertaking regular process analysis and documentation.
23MC305E.3	Customize the user experience and manage profiles, permissions, roles, and groups with Salesforce.
23MC305E.4	Apply the Beginner's mind and continually stay up to date with new Salesforce technology and inspire others too
23MC305E.5	Manage the end-to-end implementation of Salesforce, including the overall strategy and day-to-day activities involved in administering Salesforce.
23MC305E.6	

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Salesforce for Beginners: A step-by-step guide to optimize sales and marketing and automate business processes with the Salesforce platform	Sharif Shaalan and Timothy Royer	PACKT Publishers	2nd Ed, 2022
2	Salesforce CRM - The Definitive Admin Handbook: Build, configure, and customize Salesforce CRM and mobile solutions	Paul Goodey	PACKT Publisher	5th Ed, 2019
3	Learn Salesforce Lightning: The Visual Guide to the Lightning UI	Felicia Duarte, Rachelle Hoffman	Wiley Apress	2018
Reference Books				

1	Salesforce Data Architecture and Management: A pragmatic guide for aspiringSalesforce architects and developers to manage, govern, and secure their data effectively	Ahsan Zafar	PACKT Publishers	2021

Web links/Video Lectures/MOOCs

- Use the Trailhead Platform: *https://www.salesforce.com/blog/what-is-trailhead/*
  The Salesforce Administrator Trailmix :
- https://trailhead.salesforce.com/users/srebello7/trailmixes/salesforce-administrator-explorer

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MC305E.1	2							
23MC305E.2		2						
23MC305E.3							2	
23MC305E.4				1				
23MC305E.5								
23MC305E.6								

1: Low 2: Medium 3: High

Advanced Web Laboratory			
Course Code	**23MCL306**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:

1. To gain knowledge on designing and styling web pages with bootstrap.
2. Able to validate web pages at client-side.
3. Gain knowledge on server side scripting
4. Understand the basics of React and create components and lifecycle
5. Develop applications using JSX and React.
6. Develop applications using mongo DB.

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 Bootstrap 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.
Mini Project: Create a mini project that uses React and Material UI for the frontend, and a NoSQL database like MongoDB for the backend.
Note 1: In the practical exam students has to execute one program from part-A and one from part-B.

Course Outcomes: At the end of the course the student will be able to:	
23MCL306.1	Create responsive web pages using React
23MCL306.2	Implement and style pages by integrating Material UI Components.
23MCL306.3	Develop reusable React components.
23MCL306.4	Understand the application of React hooks like useState to manage state and handle user interactions effectively.
23MCL306.5	Set up and run an HTTP server using Node.js and Express, and integrating MongoDB for data storage and retrieval
23MCL306.6	Develop full-stack applications, including front-end and back-end services.

Course Articulation Matrix

(COs)	PO 1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8
23MCL306.1		2	2					
23MCL306.2			2					
23MCL306.3			2		1			
23MCL306.4	1	1		1				
23MCL306.5		1						
23MCL306.6	1	1	2	2	3			

PROGRAMMING USING C# .NET LABORATORY

Course Code	**23MCL307**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

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

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

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)
Note 1: In the practical exam student has to execute one program from part-A and one from part-B.

Course Outcomes: At the end of the course the student will be able to:	
23MCL307.1	Demonstrate command-line arguments in C# with understanding of input handling and basic arithmetic operations.
23MCL307.2	Implement boxing and unboxing operations in C#
23MCL307.3	Implement operator overloading in C# and apply them to user-defined data types.
23MCL307.4	Implement jagged arrays in C# with iteration techniques for multidimensional arrays.
23MCL307.5	Design and implement scalable and efficient database interactions using ADO.NET.
23MCL307.6	Develop ASP.NET web application by integrating databases within.

Course Articulation Matrix

(COs)	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8
23MCL307.1	2	2						
23MCL307.2	2	2						
23MCL307.3	2	2						
23MCL307.4	2	2						
23MCL307.5		**2**		**2**				
23MCL307.6		**2**		**2**				2

COMPUTER NETWORKS LABORATORY

Course Code	**23MCL308**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1-0-2)	SEE Marks	50
Credits	**02**	Exam Hours	03

Course Learning Objectives:

1. To apply the basic concepts of networking and to analyze different parameters such as bandwidth, delay, throughput of the networks for the given problem.
2. To apply different techniques to ensure the reliable and secured communication in wired and wireless communication.
3. To analyze the networking concepts of TCP/IP for wired and wireless components.
4. To identify the issues of Transport layer to analyze the congestion control mechanism.
5. To design network topology with different protocols and analyze the performance using a simulator.
6. To identify the practical utilization of Networking standards and protocols.

PART-A

Implement the following Computer Networks concepts using C/C++

1. Write a program for a distance vector algorithm to find a suitable path for transmission.
2. Using TCP/IP sockets, write a client-server program to make the client send the file name and to make the server send back the contents of the requested file if present.
3. Write a program for Hamming code generation for error detection and correction.
4. Write a program for congestion control using leaky bucket algorithm.

PART-B

(Simulate the following Computer Networks concepts using any network simulators)

1. Simulate a three nodes point to point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate the network with five nodes n0, n1, n2, n3, n4, forming a star topology. The node n4 is at the center. Node n0 is a TCP source, which transmits packets to node n3 (a TCP sink) through the node n4. Node n1 is another traffic source, and sends UDP packets to node n2 through n4. The duration of the simulation time is 10 seconds.
3. Simulate to study transmission of packets over Ethernet LAN and determine the number of packets drop destination.
4. Write a TCL Script to simulate working of multicasting routing protocol and analyze the throughput of the network
5. Simulate the different types of internet traffic such as FTP and TELNET over a wired network and analyze the packet drop and packet delivery ratio in the network.

Note 1: In the practical exam student has to execute one program from part-A and one from part-B.

Course Outcomes: At the end of the course the student will be able to:	
23MCL308.1	Apply the basic concepts of networking and to analyze different parameters such as bandwidth, delay, throughput of the networks for the given problem.
23MCL308.2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication.
23MCL308.3	Analyze the networking concepts of TCP/IP for wired and wireless components.
23MCL308.4	Identify the issues of Transport layer to analyze the congestion control mechanism.
23MCL308.5	Design network topology with different protocols and analyze the performance using a simulator.
23MCL308.6	Identify the practical utilization of Networking standards and protocols.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Computer Networks A Systems Approach (1, 2 ,3.1,3.2,3.3, 3.4,4.1, 5.1,5.2,6.2,6.36.4, 8.1,8.2,8.5, 9.1,9.3)	Larry L Peterson and Bruce S Davie	Morgan Kaufmann Publishers	5th Edition, 2012.
Reference Books				
1	Computer Networking – A Top-Down Approach Featuring the Internet	James F. Kurose, Keith W. Ross	Pearson Education	5th Edition, 2009.
2	Computer and Communication Networks	Nader. F. Mir	Pearson Prentice Hall Publishers	2010.
3	Computer Networks: An Open Source Approach	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker	McGraw Hill Publisher	2011.
4	Data Communication and Networking	Behrouz A. Forouzan	Tata McGraw – Hill	4th Edition, 2011.

Web links/Video Lectures/MOOCs/papers

1. https://www.coursera.org/learn/computer-networking
2. https://www.coursera.org/specializations/computer communications

Course Articulation Matrix

Course Outcomes	**Program Outcomes (POs)**							
(COs)	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8
23MCL308.1		2						
23MCL308.2			2					
23MCL308.3			2					
23MCL308.4		2						
23MCL308.5					2			
23MCL308.6					2			

1: Low 2: Medium 3: High

SUMMER INTERNSHIP- I			
Course Code	**23INT309**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**3**	Exam Hours	-

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:

- A mandatory summer internship of minimum 4 weeks during 2nd and 3rd semester vacation.
- Summer internship shall include inter/ intra Institutional activities
- Internship examination shall be conducted during 3rd semester and the prescribed credit shall be included in the 3rd semester.
- 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:

23INT309.1	Sketch out different project development needs.
23INT309.2	Build interpersonal skills to improve the industry- academia culture.
23INT309.3	Exhibit leadership skills and advance in their chosen career
23INT309.4	Analyze the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
23INT309.5	Develop applications using modern tools and technologies.
23INT309.6	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23INT309.1		2						
23INT309.2					2			
23INT309.3					2			2
23INT309.4						2		
23INT309.5					2			
23INT309.6							2	

1: Low 2: Medium 3: High

St Joseph Engineering College, Mangaluru
An Autonomous Institution
Master of Computer Applications (MCA)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
SEMESTER –IV

MOOC

Course Code	**23AEC401**	CIE Marks	-
Teaching Hours/Week (L:T:P)	(0:0:0)	SEE Marks	-
Credits	**04**	Exam Hours	-

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 Semester to IV Semester.

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

23AEC401.1	Get exposure to high quality education content and information
23AEC401.2	Inculcate self-learning approach
23AEC401.3	Choose courses to enhance problem solving skills
23AEC401.4	Develop interdisciplinary learning approaches
23AEC401.5	Recognize the new technologies in their area of interest
23AEC401.6	Formulate the MOOC studies for lifelong learning

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23AEC401.1	**2**	**2**	**2**	**2**	**-**		**-**	**3**
23AEC401.2	**-**	**-**	**2**	**-**	**2**	-		-
23AEC401.3	**-**	**-**	**2**	**-**	**-**	-		2
23AEC401.4	**-**	**-**	**-**	**2**	**2**	**-**	-	2
23AEC401.5	**-**	**2**	**-**	**2**	**-**	**-**		2
23AEC401.6	**2**							2

1: Low 2: Medium 3: High

PROJECT WORK

Course Code	**23MCP402**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**7**	Exam Hours	2

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 application using appropriate techniques and tools.
6. To formulate the project findings.

Project:

- The candidate should carry out the project in any industry or R&D organization or educational institution under a guide / co-guide.
- This is an individual project to be carried out during 3rd and 4th Semester
- The candidate has to present the work carried out before the examiners during the Semester End examination.
- The work carried out should be free from plagiarism.
- 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.
- Student shall indicate the different research papers, documents referred 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:

23MCP402.1	Identify different user requirements and perform feasibility analysis.
23MCP402.2	Develop innovative IT applications to meet industrial and societal needs
23MCP402.3	Adapt themselves to changing IT requirements through life-long learning
23MCP402.4	Exhibit leadership skills and advance in their chosen career.
23MCP402.5	Conduct testing of application using appropriate techniques and tools.
23MCP402.6	Formulate the project findings.

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23MCP402.1		2						
23MCP402.2			2					
23MCP402.3								2
23MCP402.4					2			
23MCP402.5				2				
23MCP402.6		2						

1: Low 2: Medium 3: High

INDUSTRY INTERNSHIP			
Course Code	**23INT403**	CIE Marks	50
Teaching Hours/Week (L:T:P)	-	SEE Marks	50
Credits	**9**	Exam Hours	3

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.
- Internship should be presented along with the report by the end of 6 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:

23INT403.1	Sketch out different project development needs.
23INT403.2	Build interpersonal skills to improve the industry- academia culture.
23INT403.3	Exhibit leadership skills and advance in their chosen career
23INT403.4	Analyze the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.
23INT403.5	Develop applications using modern tools and technologies.
23INT403.6	Demonstrate self-learning capabilities with an effective report and detailed presentation.

Course Articulation Matrix

Course Outcomes	Program Outcomes (POs)							
(COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
23INT403.1		2						
23INT403.2					2			
23INT403.3					2			2
23INT403.4				2		2		2
23INT403.5					2			
23INT403.6						2	2	

1: Low 2: Medium