Dr. Ambedkar Institute of Technology, Bengluru-56

(An Autonomous Institute, Approved by AICTE, Affiliated to V T U, Belagavi)
Nationally Accredited by NAAC with 'A' Grade

Master of Computer Applications

(Accredited by National Board of Accreditation)

Syllabus copy of the courses highlighting the focus on employability/ entrepreneurship/ skill development along with their course outcomes.

Syllabus (2020-22)

Dr. Ambedkar Institute of Technology

An Autonomous Institution, Affiliated to Visvesvaraya Technological University, Belagavi,
Aided by Govt. of Karnataka, Approved by All India Council for Technical Education (AICTE), New Delhi
Accredited by NBA and NAAC with 'A' Grade

BDA Outer Ring Road, Mallathalli, Bengaluru - 560 056

Ref. No. Dr.AIT|MCA|356|2022-23   Date: 06·01·2023

The following courses have content with a direct bearing on Employability/ Entrepreneurship/ Skill development in the scheme 2020-22.

Sl.No	Subject Code	Subject Name	Content on Employability/ Entrepreneurship/ Skill development	Year
1.	20MCA13	Web Technologies	Employability	2020-21
2.	20MCAL17	Data Structures and Algorithms Lab	Skill Development	2020-21
3.	20MCAL18	Mini Project in Web Technologies	Skill Development	2020-21
4.	20MCA21	Python Programming	Skill Development	2020-21
5.	20MCA22	Internet of Things	Employability	2020-21
6.	20MCA23	Software Engineering and Project Management	Employability	2020-21
7.	20MCA241	Cyber Security	Employability	2020-21
8.	20MCA242	Software Testing and Automation	Employability	2020-21
9.	20MCA244	Programming using C#	Employability	2020-21
10.	20MCA245	Ethical Hacking	Employability	2020-21
11.	20MCAL27	Python Programming Lab	Employability	2020-21
12.	20MCAL28	Internet of Things Lab	Employability	2020-21
13.	20MCA31	Machine Learning using Python	Employability	2020-21
14.	20MCA32	Advances in Java Programming	Skill Development	2020-21
15.	20MCA341	Digital Marketing	Employability	2020-21
16.	20MCA342	Cloud Computing	Employability	2020-21
17.	20MCA344	Programming using GOLang	Employability	2020-21

Signature of the BOS Chairman   Signature of the Principal

Ref. No. Dr.AIT|MCA|356|2022-23   Date: 06.01.2023

Sl.No	Subject Code	Subject Name	Content on Employability/ Entrepreneurship/ Skill development	Year
18.	20MCA352	5G Wireless Technologies	Skill Development	2020-21
19.	20MCA353	Artificial Intelligence	Skill Development	2020-21
20.	20MCAL36	Machine Learning using Python Lab	Employability	2020-21
21.	20MCAL37	Advanced Java Programming Lab	Employability	2020-21
22.	20MCAM38	Mini Project	Employability	2020-21
23.	20MCA42	Project Work	Employability	2020-21
24.	20MCA352	5G Wireless Technologies	Skill Development	2020-21
25.	20MCA353	Artificial Intelligence	Skill Development	2020-21
26.	20MCAL36	Machine Learning using Python Lab	Employability	2020-21
27.	20MCAL37	Advances in Java Programming Lab	Employability	2020-21
28.	20MCAM38	Mini Project	Employability	2020-21
29.	20MCA42	Project Work	Employability	2020-21

Signature of the BOS Chairman   Signature of the Principal

I SEMESTER WEB TECHNOLOGIES				
Sub Code		**20MCA13**	**CIE Marks**	**50**
Number of Lecture Hours per week		**4**	**SEE Marks**	**50**
Total number of Lecture Hours		**52**	**SEE Hours**	**3**
Lecture (L): 4	**Practicals (P): 0**	**Tutorial (T): 0**	**Total Credits**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- To design web pages using Bootstrap framework
- To develop different approaches of Server side scripts using PHP and NodeJs
- To design Single page web applications using Angular
- To design asynchronous web applications using Ajax and Angular.

MODULES	TEACHING HOURS
MODULE 1: Bootstrap	**10 Hrs**
Introduction, **Layout**: Container, Grid, **Components**: Alerts, Badge, Card, Jumbotron, Buttons/Buttons group, Navs/Navbar, Pagination, Modal,Carousel, Collapse, Form, Input group, Progress bar	
MODULE 2: Introduction to PHP	**11 Hrs**
Overview of PHP, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files handlers. Building Web applications with PHP- Using databases, tracking users- cookies, sessions.	
MODULE 3: jQuery & Ajax	**10 Hrs**
jQuery: Basics, Selecting elements, Handling Events, jQuery effects Animation- show/hide, fade, animate, stop,Sending data with AJAX-load(),$.get() and $.post() methods AJAX principles, Creating Ajax applications, Adding Server-side programming, Sending data to the server using GET and POST.Connecting to Google suggest.	
MODULE 4: Angular	**11 Hrs**
Single Page Applications, Angular Introduction, MVC Architecture, Getting Started-How Angular Works, Writing Your First Angular Web Application, Data binding, Angular Directives, Forms, Services & Dependencies, and Routing.	
MODULE 5: NodeJs	**10 Hrs**
Introduction, NPM, REPL, Global objects, Developing Node.js web application, Call back concept, Node Modules-Local Module, HTTP Module, file system modules, ExpressJS.	
Question Paper Pattern:	

• Each full question consists of 20 marks.	
• Questions are set covering all the topics under each module	

TextBooks:

1. "Bootstrap Essentials",SnigBhaumik, PACKT publishing
2. Robert W. Sebesta: Programming the World Wide Web, 7th Edition, Pearson Education,2012.
3. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw Hill, 2011
4. "ng-book -The Complete Guide to Angular", Nate Murray, Felipe Coury, Ari Lerner, and Carlos Taborda, Fullstack.io

Reference Books

1. Amos Q. Haviv," MEAN Web Development",Packt Publishing,2014.
2. Nicholas C Zakas et al: Professional AJAX, Wiley India, publications

COURSE OUTCOMES (CO)

CO1: Demonstrate the concepts of user interface and server side framework for responsive web application development

CO2: Apply the knowledge of designing web application that use asynchronous communication.

CO3: Design Single page web applications using JavaScript frameworks.

CO4: Design an interactive web page with server side scripting language for real world problems.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO5,PO11
CO2	PO2,PO4,PO5,PO11
CO3	PO2,PO4,PO5,PO7,PO11
CO4	PO5,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					H						M	
CO2		M		H	H						L	
CO3		L		M	H		H				H	
CO4					M						H	

I SEMESTER

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

Sub Code:		20MCAL16		CIE Marks:	50
Number of Lecture Hours per week:		2		SEE Marks:	50
Total number of Lecture Hours:				SEE Hours:	3
Lecture (L):	0	Practicals (P):	1	Tutorial (T):	0	Total Credits:	1

COURSE LEARNING OBJECTIVES (CLO)

- **Design & Develop the fundamentals of Object-oriented programming in Java, including defining classes, invoking methods, using class libraries.**
- **Design & Develop exception handling and multithreading concepts.**
- **Develop efficient Java applets and applications using OOP concepts**

Sl. No	Program
1.	a) Write a JAVA Program to demonstrate Constructor Overloading and Method Overloading. b) Write a JAVA Program to implement Inner class and demonstrate its Access protection.

2.	Write a program in Java for String handling which performs the following:
	     i) Checks the capacity of String Buffer objects.
	     ii) Reverses the contents of a string given on console and converts the resultant string in upper case.
	 iii) Reads a string from console and appends it to the resultant string of (ii).

3.	a) Write a JAVA Program to demonstrate multi-level Inheritance. b) Simple Program on Java for the implementation of Multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

4.	Write a JAVA program which has
	     i) A Class called Account that creates account with 500Rs minimum balance, a deposit()method to deposit amount, a withdraw() method to withdraw amount and also throws Less Balance Exception if an account holder tries to withdraw money which makes the balance become less than 500Rs.
	     ii) A Class called LessBalanceException which returns the statement that says withdraw amount (Rs) is not valid.
	 iii) A Class which creates 2 accounts, both account deposit money and one account tries to withdraw more money which generates a LessBalanceException take appropriate action for the same.

5.	Write a java program to handle the followingsystem exceptions **ArrayIndexOutOfBoundException**

	FileNotFoundException **NumberFormatException**
6.	a) Write a JAVA program using Synchronized Threads, which demonstrates Producer Consumer concept. b) Design a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 10 numbers
7.	Write a JAVA program to implement a Queue using user defined Exception Handling (also make use of throw, throws).
8.	Complete the following: i. Create a package named shape. ii. Create some classes in the package representing some common shapes like Square, Triangle, and Circle. iii. Import and compile these classes in other program.
9.	Write a JAVA program which has i). A Interface class for Stack Operations ii). A Class that implements the Stack Interface and creates a fixed length Stack. iii).A Class that implements the Stack Interface and creates a Dynamic length Stack. iv). A Class that uses both the above Stacks through Interface reference and does the Stack operations that demonstrates the runtime binding.
10.	Write a JAVA Program which uses FileInputStream / FileOutPutStream Classes.
11.	Write a JAVA applet program, which handles keyboard event.
12.	Write a JAVA program which uses Datagram Socket for Client Server Communication for multiple systems

INSTRUCTIONS:
 In the practical Examination student has to execute one program from a lot of all the 12 questions

COURSE OUTCOMES (CO)

CO1: Design and Develop Java programming languageand runtime environment. Gain knowledge and skill necessary to write java programs. Learn the object oriented concepts and its implementation in Java implement the multithreading and client side programming

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO2,PO3,PO4,PO5,PO10,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H	H	H					M	M	

<table>
<tr><td colspan="6" align="center">**I SEMESTER**</td></tr>
<tr><td colspan="6" align="center">**MINI PROJECT IN WEB TECHNOLOGIES**</td></tr>
<tr><td colspan="2">**Sub Code:**</td><td colspan="2">**20MCAM18**</td><td>**CIE Marks:**</td><td>**50**</td></tr>
<tr><td colspan="2">**Number of Lecture Hours per week:**</td><td colspan="2">**4**</td><td>**SEE Marks:**</td><td>**50**</td></tr>
<tr><td colspan="2">**Total number of Lecture Hours:**</td><td colspan="2"></td><td>**SEE Hours:**</td><td>**3**</td></tr>
<tr><td>**Lecture (L):**</td><td>**0**</td><td>**Practicals (P):** | **1**</td><td>**Tutorial (T):** | **1**</td><td>**Total Credits:**</td><td>**2**</td></tr>
</table>

Lecture (L):	0	Practicals (P):	1	Tutorial (T):	1	Total Credits:	2

COURSE LEARNING OBJECTIVES (CLO)

- **To design web pages using Bootstrap framework and add effects with jQuery.**

- **To develop different approaches of Server side scripts using PHP and NodeJs**

- **To design asynchronous web applications using Ajax and Angular.**

NOTE:
1. In the examination, one exercise from part A is to asked for 30 marks
2. Mini project student group size is limited to two students only.
3. The mini project under part B has to be evaluated for 20 marks.
4. Project report duly signed by the Guide and HOD , need to be submitted during examination.

	PART –A
Sl.No	**Program**
1.	Design a webpage with Home tab and Sign In links using Tabs/navs. Apply modal for Sign In page and an image for Home tab.
2.	Design a web page for Photo Gallery using Bootstrap Carousel.
3.	Write jQuery program to solve the following : a) Limit character input in the text area including count. b) Based on check box, disable / enables the form submit button.
4.	a) Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. b) Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
5.	Create HTML form with Name of License Holder, Fuel type, Vehicle Type, Registration Number, Make & Model, Year of Registration. On submitting, store the values in MySQL table. Retrieve and display the data based on name.
6.	Implement String Interpolation and Two-way Binding in Angular.
7.	Implement Structural Directives in Angular.
8.	Demonstrate the working of built-in module and local modules in NodeJS.

Note 1: Student has to pick one question from a lot of 6 questions

PART-B

Design and develop asynchronous/dynamic web application using the languages and concepts learnt in the theory and exercises listed in part A with a good look and feel effects. You can use any web technologies, frameworks and databases. Host the developed project using any free web hosting provider.

NOTE:

1. In the examination, one exercise from part A is asked for 30 marks.

2. The mini project under part B has to be evaluated for 20 marks.

3. A team of two students must develop the mini project.

However during the examination, each student must demonstrate the project individually.

4. The team must submit a brief project report (25-30 pages) that must include the following

   ➢ Introduction

   ➢ Requirement Analysis

   ➢ Software Requirement Specification

   ➢ Analysis and Design

   ➢ Implementation

   ➢ Testing

5. The report must be evaluated for 5 Marks. Demonstration and Viva for 15 Marks.

6. Project report duly signed by the Guide and HOD need to be submitted during examination.

INSTRUCTIONS

1. All laboratory experiments from part A are to be included for practical examination.
2. Mini project has to be evaluated for 30 Marks.
3. Report should be prepared in a standard format prescribed for project work.
4. Students are allowed to pick one experiment from the lot.
5. Strictly follow the instructions as printed on the cover page of answer script.
6. Marks distribution:
a) Part A: Procedure + Conduction + Viva:5 + 20 +5 =30 Marks
b) Part B: Demonstration + Report + Viva voce = 10+05+05 = 20 Marks

COURSE OUTCOMES (CO)

CO1: Design and Develop interactive asynchronous web application with server side script.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

CO1	PO2, PO4, PO5, PO7,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO		L		M	M		S				S	

<table>
<tr><td colspan="5" align="center">II SEMESTER
PYTHON PROGRAMMING</td></tr>
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Sub Code:		20MCA21	CIE Marks:	50
Number of Lecture Hours per week:		4	SEE Marks:	50
Total number of Lecture Hours:		52	SEE Hours:	3
Lecture (L): 4 Practical (P): 0	Tutorial (T): 0		Total Credits:	4

COURSE LEARNING OBJECTIVES (CLO)

0. **Describe the Fundamentals of Python**

1. **Demonstrate the python data structure**

2. **Implement the data wrangling and data preprocessing**

- **Understand and learn data analytics concept using Numpy, pandas and data visualization.**

MODULES	TEACHING HOURS
MODULE 1: Python Basic Concepts and Programming	**10 Hrs**
Introduction to Python programming, Features of Python, Execution of a Python Program, Python Virtual Machine (PVM, Frozen Binaries, Memory Management in Python, Garbage Collection in Python, Comparisons between C and Python, Data types in Python, Control Statements , Functions.	
MODULE 2: Python Collections	**10 Hrs**
J2EE Strings: Creating and storing strings, string operations, formattingStrings. Lists: Basic List operations, Built in functions used on lists, List Comprehensions. Tuples and Sets: Basic Operations on Tuples, Functions to Process Tuples. Set Methods, set operations. Dictionaries: Operations on Dictionaries, Dictionary Methods.	
MODULE 3: :Files and Database Connectivity	**10 Hrs**
Exceptions Files: File Handling Object oriented Programming: Basics of oops, Encapsulation, Inheritance, polymorphism	
MODULE 4: Data Pre-processing and Data Wrangling	**10 Hrs**

Acquiring Data with python: Loading from different files, Accessing databases. Cleaning data with Python: Striping out extraneous information, Normalizing data and formatting data. Combining and merging Data sets-Reshaping and pivoting-Data Transformation – String Manipulation. Web scraping: Data Acquisition by scrapping web applications.	
MODULE 5: Numpy, Pandas and Data Visualization	**12 Hrs**
Numpy: The Numpy Array, N-dimensional array operations and manipulations. Data processing using arrays. Pandas: Essential Functionality, Data frames, computing descriptive statistics, Time series analysis with pandas. Data Visualization: Matplotlibs package-plotting graphs-controlling Graph-Adding Text- More Graph types. Data Visualization with Seaborne.	

Question Paper Pattern:
- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

Text Books:

1. Core Python Programming: 2017 Edition, R. Nageswara Rao, DreamTechPublication.

2. Python for Data Analysis 2nd Edition, O'Reilly Publications

3. Exploring Python, Timothy A. Budd, Mc Graw Hill Education

4. Introduction to Python Programming ,Gowrihankar S, Veena A, CRC Press/Tyler and Francies

Reference Books

1. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr.

2. Python for Informatics: Exploring Information, Charles Severance.

3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication.

4. Mastering Python Fundamentals with Ease, Asha Gowda Kare Gowda, Bhargavi K,Lambart Academic publishing.

COURSE OUTCOMES (CO)

CO1:Understand the Fundamentals of Python programming

CO2: Demonstrate various features of python programming for building   applications.

CO3: Apply python programming for designing the applications efficiently.

CO4:Design and Develop applications to be deployed in real world scenarios.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES	
Course Outcomes(CO)	**Mapping with Program Outcomes(PO)**
CO 1	**PO1,PO2,PO3,PO4,PO5,PO8**
CO 2	**PO1,PO2,PO3,PO4**
CO 3	**PO1,PO2,PO3,PO4,PO5**
CO 4	**PO1,PO2,PO3,PO4,PO5**

LEVEL OF CO-PO MAPPING TABLE

CO/ PO	PO	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H	M	S							
CO2	H	M	H	H	L							
CO3	M	M	H	H	L					M	M	
CO4	M	M	H	H	L					H	H	

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<tr><td colspan="5"><h2>II SEMESTER
INTERNET OF THINGS</h2></td></tr>
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II SEMESTER				
INTERNET OF THINGS				
Sub Code:		**20MCA22**	**CIE Marks:**	**50**
Number of Lecture Hours per week:		**04**	**SEE Marks:**	**50**
Total number of Lecture Hours:		**52**	**SEE Hours:**	**03**
Lecture (L): 4	**Practicals (P):** 0	**Tutorial (T):** 0	**Total Credits:**	**04**

COURSE LEARNING OBJECTIVES (CLO)

- **Learn the evolution of IOT from M2M to global Context.**

- **Understand IoT in managing data and knowledge.**

- **Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.**

- **Analyse the application areas of IOT .**

- **Design IoT projects to make the Real World work easy.**

MODULES	**TEACHING HOURS**
MODULE 1: Introduction to IoT	**6 Hrs**
Definition and characteristics of IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Modern day IoT applications, Physical and Logical design of IoT, IoT communicational model, IoT Challenges, The Core IoT Functional Stack.	
MODULE 2: Smart Things	**6 Hrs**
IoT Sensors, Actuators, IoT Networking, Connecting Smart Objects, Communications Criteria, IoT Access Technologies, Sensor Networks, IoT Access Technologies. IoT Enablers, Connectivity Layers, Baseline Technologies: M2M, CPS and WoT.	
MODULE 3: Embedded System Platform for IoT	**15 Hrs**
Embedded Devices: Introduction, Processor for things, Things design, Gateway design. **Arduino**: Introduction, Getting started with Arduino Feature of Arduino, Types of Arduino Board, Arduino IDE, Anatomy of Interactive devices, Blinking an LED. **Raspberry Pi**: Introduction, Essential of setting Raspberry Pi, Programming	

Raspberry with Python. **Mobile Application Development for IoT using Android:** Sending and Receiving Data via Bluetooth with an Android Device, Android application for Home Automation.	
MODULE 4: Communication Technologies	**15 Hrs**
Introduction,OSI and TCP/IP communication model for communication network.DataProtocol:MQTT,CoAP,AMQP,XMPP,WebSocket. **CommunicationProtocols:**IntroductiontoIEEE802.15.4,Zigbee,6LowPan, WirelessHART,Z –Wave, ISA 100, Bluetooth, NFC, RFID,LoRa. **Applications of IoT**: Smart Cities and Smart Homes, Connected Vehicles, Industrial Internet of Things, program practices. Problem statements for project work.	
MODULE 5: Big Data and Cloud Computing for IoT	**10 Hrs**
Big Data for IoT: Introduction, IoT platforms, The Eight main components of an IoT platform. IoT platform in Action: Use case for an appliance retailer. **Cloud Computing for IoT:** Sensor cloud, Fog Computing, Sending & Receiving Data to & from cloud, hands on example programs. **Examples of IoT platforms:**AWS IoT, Microsoft Azure IoT,IBM Watson, Cisco's IoT,SalesForce'sIoT,Carriots,Oracle Integrated Cloud, How to select the right IoT platform.	
Question Paper Pattern: • **Each full question consists of 20 marks.** • **Questions are set covering all the topics under each module**	
TextBooks	
1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).	
2. "Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti (Hands-on-Approach)", 1stEdition, VPT, 2014. (ISBN: 978-8173719547).	

Reference Books
1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things:Introduction to a New Age of Intelligence",1 stEdition,AcademicPress, 2014.
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224).

COURSE OUTCOMES (CO)

CO1: Understand the concepts and application areas of IOT ·

CO2: Apply the concepts of IoT to different applications.

CO3: Analyze the IoT architecture and design along with functional/compute stack and data management.

CO4: Design and Implement IoT applications in different domains and embedded platform.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO1,PO5, PO10
CO2	PO2,PO3,PO4,PO5,PO8
CO3	PO2, PO3,PO4.
CO4	PO2, PO3, PO4, PO8, PO11, PO12.

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M					H		
CO2		H	M	M	H			L				
CO3		H	M	H						L		
CO4		H	H	H	H			M			H	H

II SEMESTER
PYTHON PROGRAMMING LAB

Course Code		20MCAL27		CIE Marks	50
Number of Practical Hours/Week		**02**		**SEE Marks**	**50**
Total Number of Lecture Hours:		**26**		**SEE Hours**	**3**
Lecture (L):	**0**	**Practicals (P):**	**1**	**Tutorial (T):**	**0**	**Total Credits:**	**1**

Course Learning Objective(CLO) :

- **Learn basics concepts of python programming.**

- **Implement advanced programs in python based on the knowledge gained.**

List of Programs	
1.	Demonstrate a python program on i) Control statements ii) Functions
2.	Demonstrate string operations
3.	Demonstrate list operations
4.	Demonstrate Set operations
5.	Demonstrate operations on Tuple
6.	Demonstrate operations on dictionary
7.	Demonstrate File handling
8.	Demonstrate Object oriented Concepts
9.	Implement a python program to demonstrate Importing Datasets , Cleaning the Data
10.	Data frame manipulation
11.	Implement a python program to demonstrate the following using NumPy a) Array manipulation, Searching, Sorting and splitting. b) broadcasting and Plotting NumPy arrays
12.	Write a Python program to demonstrate Time series analysis with Pandas.
13.	Implement a python program to demonstrate Data visualization with various Types of Graphs

Note 1: In the practical Examination each student has to pick one question from a lot of all the 13 questions.

Course outcomes(CO): After completing the course the students are able to:

CO: Design and develop an applications using Python Programming for real world senario.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO	PO1,PO2,PO3,PO4,PO5,PO8,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	H	H	M	H	M			H	H			

II SEMESTER

INTERNET OF THINGS LAB

Sub Code:			20MCAL28		CIE Marks:	50
Number of Lecture Hours per week:			2		SEE Marks:	100
Total number of Lecture Hours:			26		SEE Hours:	3
Lecture (L):		Practicals (P):	1	Tutorial (T):	0	Total Credits:	01

COURSE LEARNING OBJECTIVES (CLO)

- **To design and implement IoT programs Arduino /Raspberry pi.**

PART-A

1.TO interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn
ON LED for 1 sec after every 2 seconds.

2. To interfaceDHT11 sensor with Arduino /Raspberry Pi and write a program to print temperature and humidity readings.

3. To interface motor using relay with Arduino /Raspberry and write a program to turn on Motor when push button was pressed.

4. To interface Bluetooth with Arduino /Raspberry and write a program to send sensor data to smartphone using Bluetooth.

5. Write a program on Arduino /Raspberry pi to to retrieve temperature and humidity data from things speak cloud.

PART-B

1. Designimplementation of IoT for Home Automation.

2. Design and implementation of IoT for Smart parking.

COURSE OUTCOMES (CO)

CO1:Implement IoT programs using Arduino /Raspberry pi.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO2,PO3,PO4,PO5

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M	M	H	H							

II SEMESTER

MINI PROJECT IN MOBILE APPLICATION DEVELOPMENT

Course Code		20MCAM29		CIE Marks	50
Number of Practical Hours/Week and		**2**		**SEE Marks**	**50**
Number of Instructional Hours/Week		**2**			
Total Number of Lecture Hours		**26+13**		**SEE Hours**	**03**
Lecture (L):	**0**	**Practicals(P):**	**1**	**Tutorial (T):**	**1**	**Total Credits:**	**2**

Course Learning Objectives:

- **Learn the basics of mobile app development**

- **Build mobile applications using database**

- **Develop mobile app that uses GPS location information**

- **Students will learn to develop a mobile app project using multiple features learnt**

NOTE:
1. In the examination, one exercise from part A is to asked for 20 marks
2. Mini project student group size is limited to two students only.
3. The mini project under part B has to be evaluated for 30 marks.
4. Project report duly signed by the Guide and HOD , need to be submitted during examination.

PART - A

Program List

1.	Exploring layouts
2.	Exploring widgets
3.	Android activity life cycle
4.	Intents in Android and Shared preferences
5.	Sending SMS and EMAIL
6.	Fragments in android
7.	Animations
8.	Databases and content providers
9.	Sensors and location based services
10.	Audio playback and image capture

Note 1: Student has to pick one question from a lot of 10 questions

MINI-PROJECT

Students should be able to build a complete mobile app using multiple features learnt in Part – A with user interfaces and database connectivity. The Project should be deployed on the cloud like any cloud tool (ex.MS Azure, AWS etc..).The project work should be carried out with team strength of maximum two.

NOTE:

1. In the examination, one exercise from part A is asked for 20 marks.

2. The mini project under part B has to be evaluated for 30 marks.

3. A team of two students must develop the mini project.

However during the examination, each student must demonstrate the project individually.

4. The team must submit a brief project report (25-30 pages) that must include the following

   ➢ Introduction

   ➢ Requirement Analysis

   ➢ Software Requirement Specification

   ➢ Analysis and Design

   ➢ Implementation

   ➢ Testing

5. The report must be evaluated for 5 Marks. Demonstration and Viva for 15 Marks.

6. Project report duly signed by the Guide and HOD need to be submitted during examination.

Course Outcome:

CO: Design and develop android mobile applications for real world senario.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO	PO1,PO2,PO4,PO5,PO8,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1	PO12
CO	M	M	H	H	M	H	H					

<table>
<tr><td colspan="6" align="center">**II SEMESTER**
PROGRAMMING USING C#</td></tr>
</table>

Course Code:			**20MCA254**	**CIE Marks:**	**50**
Number of Lecture Hours per week:			**4**	**SEE Marks:**	**50**
Total number of Lecture Hours:			**39**	**SEE Hours:**	**3 Hrs**
Lecture (L):	**3**	**Practicals (P):**	**1**	**Tutorial (T):**	**0**	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

3. **To describe the Fundamentals of .Net framework**
4. **To demonstrate Object Oriented Programming concepts using C#**
5. **To implement delegates, event handling and exception handling**
6. **To develop Web applications using ASP.NET,ADO.NET**

MODULES	TEACHING HOURS
MODULE 1: 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: CLR, CTS, Metadata and Assemblies, .NET Framework Class Library, Windows Forms, ASP .NET and ASP .NET AJAX, ADO .NET, Windows workflow Foundation, Windows Presentation Foundation, Windows Communication Foundation, Widows Card Space and LINQ. **Introducing C#** Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing andUnBoxing , Variables and Constants . Expression and Operators : Operator Precedence, Using the ?? (Null Coalescing) Operator, Using the :: (Scope Resolution) Operator and Using the is and as Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements	7 Hrs
MODULE 2: Namespaces,Classes and Object Oriented Programming Namespaces, The System namespace, Classes and Objects: Creating a Class, Creating an Object, Using this Keyword, 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 Class Members. Properties: Read-only Property, Static Property,	8 Hrs

Accessibility of assessors and Anonymous types. Indexers, Structs: Syntax of a struct and Access Modifiers for structs.System.Object Class **Encapsulation:** Encapsulation using assessors 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: Delegates, Events, Exception Handling **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	**8 Hrs**
MODULE 4: Graphical User Interface with 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.	**8 Hrs**
MODULE 5: Web App Development and Data Access using ADO.NET Introduction to Web Basics, Multitier Application Architecture, First Web Application: Building Web-Time Application, Examining Web-Time.aspx's Code-Behind File, Understanding Master pages, Standard Web Controls: Designing a Form, Validation Controls, GridView Control, DropDownList, Session Tracking.Set up the sample database,Create the forms and add controls,Store the connection string,Retrieve the connection string,Write the code for the forms,Test your application **ASP.NET AJAX :**ExploringAJAX,Need for AJAX, AJAX and other Technologies, AJAX Server Controls, ScriptManager control, Update Panel, UpdateProgress Control, Creating Simple Application using AJAX Server Controls.	**8 Hrs**
Question Paper Pattern: • **Each full question consists of 20 marks.** • **Questions are set covering all the topics under each module**	
TextBooks:	
1. .NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiley-Dream Tech Press.	

2.	Paul Deitel and Harvey Deitel: C# 2010 for Programmers, 4th Edition, Pearson Education.

Reference Books
1. Andrew Trolsen: Pro C# 5.0 and the .NET 4.5 Framework, 6th Edition, WileyAppress.
2. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.
3. Herbert Schildt: Complete Reference C# 4.0, Tata McGraw Hill, 2010.

COURSE OUTCOMES (CO)
CO1: Distinguish the features of C# and client-server concepts using .Net Framework Components.
CO2:Demonstrate delegates, events and exception handling with ASP, Win Form, ADO.NET.
CO3:Develop Graphical User Interface for various applications
CO4:Develop Web based and Console based applications with database connectivity

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	**PO1,PO2,PO3,PO4,PO5,PO8**
CO2	**PO1,PO2,PO3,PO4**
CO3	**PO1,PO2,PO3,PO4,PO5**
CO4	**PO1,PO2,PO3,PO4,PO5**

LEVEL OF CO-PO MAPPING TABLE

CO/P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**H**	**L**	**L**	**M**	**L**			**L**				
CO2	**H**	**H**	**L**	**M**								
CO3	**M**	**H**	**M**	**H**	**L**							
CO4	**M**	**H**	**H**	**H**	**H**							

II SEMESTER

ETHICAL HACKING

Sub Code:				20MCA255		CIE Marks:	50
Number of Lecture Hours per week:				4		SEE Marks:	50
Total number of Lecture Hours:				52		SEE Hours:	3
Lecture (L):	3	Practicals (P):	1	Tutorial (T):	0	Total Credits:	4

COURSE LEARNING OBJECTIVES (CLO)

- **Introduce the fundamental aspects of ethical hacking**

- **Demonstrate different features of ethical hacking**

- **Remediate computer security breaches, attack and defence**

- **Analyze encryption techniques and security architecture**

MODULES	TEACHING HOURS
MODULE 1: Ethical Hacking	**10Hrs**
Overview of Ethics ,Overview of Ethical Hacking ,Methodology of ethical Hacking ,Reconnaissance and Foot printing ,Scanning and Enumeration ,Gaining Access ,Maintaining Access ,Covering Tracks. **Security Foundations:** The Triad, Risk, Policies, Standards, and Procedures, Security Technology, Being Prepared	
MODULE 2: System Hacking & Malware	**10 Hrs**
Searching for Exploits ,System Compromise ,Metasploit Modules ,Exploit-DB ,Gathering Passwords ,Password Cracking ,John the Ripper ,Rainbow Tables ,Client-Side Vulnerabilities ,Post Exploitation ,Privilege Escalation ,Pivoting ,Persistence ,Covering Tracks. Malware Types ,,Virus ,Worm ,Trojan ,Botnet ,Ransomware , Dropper ,Malware Analysis ,Static Analysis, Dynamic Analysis , Creating Malware ,Writing Your Own, Using Metasploit ,Malware Infrastructure ,Antivirus Solutions	
MODULE 3: Sniffing and Social Engineering	**11 Hrs**

Packet Capture .tcpdump ,tshark ,Wireshark ,Berkeley Packet Filter (BPF) ,Port ,Mrroring/Spanning , Packet Analysis ,Spoofing Attacks ,ARP Spoofing ,DNS Spoofing ,sslstrip Social Engineering ,Pretexting ,Social Engineering Vectors ,Physical Social Engineering ,Badge Access ,Man Traps ,Biometrics ,Phone Calls ,Baiting ,Phishing Attacks ,Website Attacks ,Cloning ,Rogue Attacks ,Wireless Social Engineering ,Automating Social Engineering	
MODULE 4: Wireless Security , Attack and Defence	**11 Hrs**
Wi-Fi ,Wi-Fi Network Types ,Wi-Fi Authentication ,Wi-Fi Encryption ,Bring Your Own Device (BYOD) ,Wi-Fi Attacks ,Bluetooth ,Scanning ,Bluejacking ,Bluesnarfing ,Bluebugging ,Mobile Devices ,Mobile Device Attacks. Web Application Attacks ,XML External Entity Processing ,Cross-Site Scripting (XSS) ,SQL Injection ,Command Injection ,Denial of Service Attacks ,Bandwidth Attacks ,Slow Attacks ,Legacy ,Application Exploitation ,Buffer Overflow ,Heap Spraying ,Lateral Movement ,Defense in Depth/Defense in Breadth ,Defensible Network Architecture.	
MODULE 5: Cryptography & Security Architecture and Design	**10 Hrs**
Basic Encryption ,Substitution Ciphers ,Diffie-Hellman ,Symmetric Key Cryptography ,Data Encryption Standard (DES) ,Advanced Encryption Standard (AES) ,Asymmetric Key Cryptography ,Hybrid Cryptosystem ,Non-Repudiation ,Elliptic Curve Cryptography ,Certificate Authorities and Key Management ,Certificate Authority ,Trusted Third Party ,Self-Signed Certificates ,Cryptographic Hashing ,PGP and S/MIME. Data Classification ,Security Models ,State Machine ,Biba ,Bell-LaPadula ,Clark-Wilson Integrity Model ,Application Architecture ,n-tier Application Design ,Service-Oriented Architecture ,Cloud-Based Applications ,Database Considerations ,Security Architecture .	
Practical contents	
1. Scanning for Open Ports of Remote Machine 2. Gaining SSH Access of Remote Machine using hydra Tool 3. Accessing Wife Saved Password in Windows Machine 4. Accessing Wife Saved Password in Linux Machine 5. Accessing Key using Keylogger through email/Telegram 6. Sniffing Wifi Password of Access Point 7. Accessing System, Boot and CPU information of windows machine 8. Obtaining Screenshots of Remote Machine	
Question Paper Pattern: • **Each full question consists of 20 marks.** • **Questions are set covering all the topics under each module**	

TextBooks:
1. CEH Certified Ethical Hackers All-in-one Exam Guide,Willy publishing inc
2. Computer Hacking Beginners Guide: How to Hack Wireless Network, Basic Security and Penetration Testing, Kali Linux, Your First Hack Kindle Edition
3. The Web Application Hacker's Handbook, DafyddStuttard Marcus Pinto,Willy publishing inc
Reference Books
1. Hacking: The Art of Exploitation, John Ericson, 2nd Edition
2. Penetration Testing: A Hands-On Introduction to Hacking
by Georgia Weidman
3. Penetration Testing with Kali Linux, Offensive security
4. Wireless Attacks – WiFu, Mati Aharoni Devon Kearns Thomas d'Otreppe de Bouvette
COURSE OUTCOMES (CO)
CO1: Understand the features of ethical hacking
CO2: Analyse the security breaches required for ethical hacking
CO3:Apply the ethical hacking techniques in the real time scenario

Course outcomes mapping with program outcomes

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO1, PO3,PO5,
CO2	PO2, PO3, PO6, PO9, PO10
CO3	PO4, PO6, PO8, PO10

CO/P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		M		H							
CO2		M	L			H			H	H		
CO3				H		H		L		H		

III SEMESTER				
MACHINE LEARNING USING PYTHON				
Sub Code:		**20MCA31**	**CIE Marks:**	**50**
Number of Lecture Hours per week:		**4**	**SEE Marks:**	**50**
Total number of Lecture Hours:		**52**	**SEE Hours:**	**3**
Lecture (L): 4	**Practical (P):** 0	**Tutorial (T):** 0	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- **To distinguish between, supervised & unsupervised and gain knowledge about basic concepts of Machine Learning.**
- **To introduce participants to the fundamentals of data analytics using Python**
- **To apply the appropriate machine learning strategy for any given problem.**
- **To develop skills of using recent machine learning software for solving practical problems.**

MODULES	TEACHING HOURS
MODULE 1: Introduction to Machine learning	**10 Hrs**
Introduction toMachine Learning, types of Machine learning, Applications, Machine Learning Process, Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning	
MODULE 2: Modelling and Evaluation	**10 Hrs**
Selecting a Model, Training a model, Model representation and interpretability, Evaluating performance of a model Introduction to Bayes Theorem and Concept learning, Naive Bayes Classifier, Applications of Naïve Bayes Classifier, Bayesian Belief Network in Machine Learning	
MODULE 3: Unsupervised Learning & Supervised Learning	**11 Hrs**
Clustering –Different types of the clustering techniques, K-Means Clustering Algorithm Classification-Introduction, KNN classifier, Decision Tree, Random Forest Model, Support Vector Machines	
MODULE 4: Regression Learning	**10 Hrs**
Training a model-Linear Regression, Multiple Linear regression, Improving accuracy of Linear Regression Model, k-fold cross validation method, Polynomial Regression Model	
MODULE 5: Neural Network and Deep Learning	**11 Hrs**

Artificial Neural Networks: IntroductionArtificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptron, Back propagation algorithm. Deep Learning, Deep Learning Architectures.	

Question Paper Pattern:
- Each full question consists of 20 marks.
- Questions are set covering all the topics under each module

TextBooks:

1. Fabio Nelli, " Python Data Analytics", Apress,Springer Science + Business Media Finance Inc (SSBM Finance Inc).

2. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, 1st Edition, 2019, Pearson Publications, , ISBN 978-93-530-6669-7

3. Machine Learning, Tom M Mitchel, McGraw Hill publications,ISBN-0070428077

4. Machine Learning with Python: Design and Develop Machine Learning and Deep Learning, BPB Publishing, India,2018

Reference Books

1. Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition.

2. EthemAlpaydin "Introduction To Machine Learning" 2nd Edition PHI Learning Pvt. Ltd- New Delhi.

COURSE OUTCOMES (CO)

CO1: Explain the concepts related to Machine Learning techniques.

CO2: Demonstrate Pre-processing techniques and perform exploratory data analysis related to a scenario.

CO3: Identify and apply the appropriate techniques to process the data and solve the applications using machine learning techniques

CO4: Apply data analytics principles and techniques of Machine learning to solve real time problems.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO2,
CO2	PO1,PO2,PO4,PO8
CO3	PO1,PO2,PO4,PO5,PO8,PO10,PO11
CO4	PO1,PO2,PO4,PO5,PO8,PO10,PO11

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LEVEL OF CO-PO MAPPING TABLE												
CO1	M	S										M
CO2	L	M		S	S			M				L
CO3	L	L		S	S			M		S	M	L
CO4	L	L		S	S			M		S	M	L

III SEMESTER ADVANCES IN JAVA			
Sub Code:	**20MCA32**	**CIE Marks:**	**50**
Number of Lecture Hours per week:	**4**	**SEE Marks:**	**50**
Total number of Lecture Hours:	**52**	**SEE Hours:**	**3**
Lecture (L): 4 **Practical (P):** 0	**Tutorial (T):** 0	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- **Describe the JDBC concepts and designing an applications using JDBC.**
- **Introduce the concepts of server side programming using Servlets & JSP.**
- **Understand Java Beans and different types of enterprise java beans and implement them. Design and developing an application using springs framework.**

MODULES	TEACHING HOURS
MODULE 1: JDBC	**10 Hrs**
The Concept of JDBC, JDBC Driver types, A brief overview of JDBC process, Database Connection, Statement objects, Result Set, Transaction Management, Data types, Exceptions. Introduction to Embedded SQL with JDBC.	
MODULE 2: SERVLET	**10 Hrs**
Architecture, Servlet Structure, Servlet packaging, HTML building utilities, Lifecycle, SingleThreadModel interface, Handling Client Request: Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies, Session Tracking.	
MODULE 3: JSP	**10 Hrs**
Overview of JSP: JSP Technology, Benefits of JSP, Advantages of JSP, Basic syntax. JSP life cycle, JSP tags, looping statements, The JSP page directive, JSP Action tags, JSP implicit objects.JSP form processing, JSP database connectivity.	
MODULE 4: Annotations & EJB	**10 Hrs**
Annotations Creating Packages, Interfaces, JAR files and Annotations. The core java API package, New java. Lang Sub package, Built-in Annotations with examples. **Java Beans and EJB** Working with Java Beans. Introspection, creating java bean, manifest file, Bean Jar file, adding controls, Bean properties, Simple properties, bound properties, Icon, Bean info class, Constrained Properties, Persistence, Java Beans API. Enterprise Java Beans: The EJB Container, EJB Classes, EJB Interface. Deployment Descriptor, Session Java Bean, Entity Java Bean, Message-Driven Bean.	

MODULE 5: Spring Framework	12 Hrs

Spring Framework

Introduction to Spring Framework, Spring Framework architecture, IOC-containers, Bean scopes, Bean Life cycle, Dependency Injection, Beans wiring, Event Handling in springs, Custom events in springs Spring AOP, and Spring JDBC.

Spring MVC

Spring MVC : Spring 3.0 features –Introduction to Spring MVC –Handler Mapping – Controllers –Validations –Handler Interceptors –Views –Form tags.

Question Paper Pattern:

- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

Text Books:

1. Marty Hall, Larry Brown. Core Servlets and Java Server Pages. Volume 1: Core Technologies. 2nd Edition. (Chapter 3,4,5,6,7,8,9,10,11,12,13,14).

2. Java 6 Programming Black Book, Dreamtech Press. 2012 (Chapter 17,18,19,20,21,22,27,28,29,30).

3. Andrew LeeRubinger, Bill Burke. Developing Enterprise Java Components. Enterprise JavaBeans 3.1.O'reilly. (Chapter 1,2,3,4,5,6,7,8,9,10,11).

Reference Books

1. Michael Sikora, EJB 3 Developer Guide, A practical guide for developers and architects to the Enterprise Java Beans Standard, Shroff Publishers & Distributors PVT LTD. July 2008.

2. Herbert Schildt, Java The Complete Reference, 8th Edition. Comprehensive coverage of the Java Language. Tata McGraw-Hill Edition – 2011.

COURSE OUTCOMES (CO)

CO1:Understand Concept of advanced java concepts.

CO2:Analyze the methodologies and constraints of implementation.

CO3: Apply the advanced java methodologies to design applications.

CO4: Design and Develop applications to be deployed in real world scenarios.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO 1	PO2,PO3,PO5
CO 2	PO2,PO4,PO5,PO11
CO 3	PO2,PO4,PO5,PO8,PO11
CO 4	PO2,PO4,PO5,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

PO												
CO 1		M	H	H								
CO 2		M		H	M						H	
CO 3		M		H	M			H			M	
CO 4		S		H	H			H			M	

III SEMESTER CLOUD COMPUTING THEORY AND PRACTICE			
Course code:	**20MCA342**	**CIE Marks:**	**50**
Number of Lecture Hours per week:	**3**	**SEE Marks:**	**50**
Total number of Lecture Hours:	**52**	**SEE Hours:**	**3**
Lecture (L): 3 **Practical (P): 1**	**Tutorial (T): -**	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- **Introduce the fundamental aspects of cloud computing**

- **Discuss virtualization technologies along with the architectural models of cloud computing.**

- **Leverage the prominent Cloud computing technologies available in the market place.**

- **Demonstrate different features of cloud platforms used in Industry**

- **To understand how energy efficiency achieved in cloud computing using green computing and understand the mechanism needed to harness cloud computing in the respective endeavours.**

MODULES	TEACHING HOURS
MODULE-1: CLOUD COMPUTING OVERVIEW	**12 Hrs**
Cloud Computing Overview, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Architecture, Characteristics and Benefits, Challenges in the cloud, Historical Developments, Distributed Systems, Virtualization, Web 20, Service Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Forcecom and Salesforcecom,	
MODULE-2: VIRTUALIZATION	**10Hrs**
Virtualization Introduction, Characteristics of virtualized environments, Increased security, Managed execution, Portability, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples- Xen par virtualization, VMware: full virtualization, Microsoft Hyper-V. Cloud Computing Architecture: Introduction, Reference model- Architecture, Infrastructure- and hardware-as-a-service, Platform as a service, Software as a service, Deployment Model- Public clouds, Private clouds, Hybrid clouds, Community clouds, Open challenges.	

MODULE-3: CLOUD MANAGEMENT	10 Hrs
Service Level Agreement, Cloud Economics, Managing Data, Introduction to Map Reduce, Open Stack, Resource Management.	
MODULE-4: CLOUD PLATFORMS IN INDUSTRY	**10 Hrs**
Amazon web services: Compute services, Storage services, Communication services, Additional services. Google Cloud, AppEngine : Architecture and core concepts, Application life cycle, Cost model Observations Microsoft Azure: Azure core concepts, SQL Azure, Windows Azure platform appliance , Observations.	
MODULE-5: ADVANCED TOPICS IN CLOUD COMPUTING	**10 Hrs**
Green cloud computing, Introduction to Docker Container, Sensor Cloud Computing, IoT Cloud, Fog Computing, Mobile Cloud Computing.	
PRACTICAL CONTENT:	
Working with Amazon Web Services(AWS): - Familiarize the services by AWS - Creating user login - Creating Linux, Windows virtual machines instance using EC2 - Run simple applications on EC2 Instance - Creating Storage using S3 - Create a Backup using Image and launch new instance using Backup image - Creating an RDS Instance with MySQL Workbench and Dynamo DB - Demonstrate Database application on AWS - Upgrading and downgrading the infrastructure based on the requirement - Demonstrate Load balancing using different instance of EC2 - Launch a web application. - Demonstration of Identity and Access management. - Demonstrate Elastic bean stack - Demonstrate AWS dynamic web application Salesforce Trailhead Platform - Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database on Salesforce cloud	

platform.

- Create a web application to implement an online cart for adding items to a shopping cart and deleting it.

- Create a web application to enter the faculty details like faculty ID, faculty name, and salary to a database and calculate the income tax to be paid by the faculty at the end of financial year.

- Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.

- Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.

- Develop Department events' registration app with an object containing event name, date/time, venue as parent relationship, another object containing student name, branch, event name, date/time, and venue as child relationship.

- Develop Blood donation registration app with an object which records donors' name , age and blood group as parent relationship and another object containing hemoglobin level, donated or not details (if age>18) child relationship.

- Develop Attendance maintenance app with an object to record student details, attendance and provide a link to college websites' results webpage.

- Create a web application with objects to maintain database of an art gallery which contains objects like artists, arts, and inventory and provide a link to any of the art gallery website.

Question Paper Pattern:
- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

Textbooks:

Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley,2011
Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010
Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley- India,2010

Reference Books:

Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds. Cloud computing: Principles and paradigms. Vol. 87. John Wiley & Sons, 2010.

COURSE OUTCOMES (CO)

CO1: Explain the fundamental principles of cloud computing and its related Concepts.

CO2: Analyse Prominent Cloud computing technologies available in the marketplace.

CO3: Apply suitable applications to leverage the strength of cloud computing.

CO4: Develop the applications of cloud Computing that can harness the power of cloud computing.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES

COs	Mapping with POs
CO1	PO1,PO2,PO3
CO2	PO1,PO5,PO8,PO10
CO3	PO1,PO2,PO3,P10
CO4	PO1,PO2,PO3,PO4,PO5

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M									
CO2	L				S			S		M		
CO3	M	M	M							L		
CO4	S	S	M	M	M							

III SEMESTER BIG DATA ANALYTICS			
Sub Code:	**20MCA343**	**CIE Marks:**	**50**
Number of Lecture Hours per week:	**3+2**	**SEE Marks:**	**50**
Total number of Lecture Hours:	**52**	**SEE Hours:**	**3**
Lecture (L): 3 **Practical (P):** 1	**Tutorial (T):** 0	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- **To impart fundamental concepts about big data and its identification.**
- **To analyse the design of Hadoop Distributed Files system.**
- **To understand and analyse Map Reduce technique for solving Big Data problems**
- **To analyse different hadoop related tools like Pig & Hive and manage NOSQL databases.**

MODULES	TEACHING HOURS
MODULE 1: Big Data & Hadoop Eco system	**10 Hrs**
Example Applications, Basic Nomenclature, Analysis Process Model, Analytical Model Requirements , types of Data Sources, Sampling, Types of data elements, data explorations, exploratory statistical analysis, missing values, outlier detection and Treatment, cloud and Big Data –Predictive Analytics. A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem Hadoop Releases Response.	
MODULE 2: The Hadoop Distributed File system	**11 Hrs**
The Hadoop Distributed File system The Design of HDFS, HDFS Concepts, Blocks, Name nodes and Datanodes, HDFS Federation, HDFS High-Availability, The Command Line Interface, Basic File system Operations, Hadoop File systems Interfaces ,The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the File System API, Writing Data, Directories, Querying the File system, 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 3: Map Reduce	**10 Hrs**
A Weather Dataset ,Data Format, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Map and Reduce, Working of Map Reduce - Anatomy of a Map Reduce Job Run, Failures, Shuffle and Sort, Task Execution, Map Reduce Formats - Input Formats, Output Formats	
MODULE 4: NOSQL &Hadoop Tool-Pig	**11 Hrs**
NOSQL Data bases Introduction to NoSQL– Types of NOSQL Data bases-Key-Value based , Document based, Column-oriented data models, graph databases	

Hadoop Tool-Pig Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts, **Pig Latin** – Structure, Statements, Expressions, Types, Schemas, Functions, Macros, User-Defined Functions DataProcessing Operators – Loading and storing of data, Filtering data, Groupingand Joining data	
MODULE 5: Hadoop Tool-Hive	**10 Hrs**
Installing Hive – The Hive shell, Hive – Architecture, data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries. Tables – Managed Tables and External Tables, Partitions and Buckets, Importing Data, Altering Tables, Dropping Tables Querying Data – Sorting and Aggregating, Storage Formats, Joins, Sub queries, Views.	

Question Paper Pattern:
- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

TextBooks:

3. Bart Baesens, " Analytics in a Big Data World : The Essential Guide to Data Science and its Applications" Wiley

4. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.

5. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

6. Alan Gates, "Programming Pig", O'Reilley, 2011

Reference Books

3. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

4. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.

COURSE OUTCOMES (CO)

CO1: Explain the fundamentals of big data analytical techniques and usage of hadoop tools.

CO2: Analyse Hadoop ecosystem and Map Reduce concept to solve big data problems.

CO3: Design a Map-Reduce model to process the data using hadoop tools for a use case.

CO4: Evaluate the performance of data analytics and visualize the results.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	**Mapping with Program Outcomes(POs)**
CO1	**PO3,PO4**
CO2	**PO3,PO4,PO5**
CO3	**PO3,PO4,PO5,PO7,PO10,PO11**
CO4	**PO2,PO3,PO4,PO5,PO7,PO10,PO11**

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M	H								
CO2			M	H	H							
CO3			M	M	H		L			M	L	
CO4		L	M	M	H		H			H	H	

III SEMESTER

FULL STACK WEB DEVELOPMENT

Sub Code:		20MCA345		CIE Marks:	50
Number of Lecture Hours per week:		**3+2**		**SEE Marks:**	**50**
Total number of Lecture Hours:		**52**		**SEE Hours:**	**3**
Lecture (L):	**3**	**Practicals (P):**	**1**	**Tutorial (T):**	**0**	**Total Credits:**	**4**

COURSE LEARNING OBJECTIVES (CLO)

- **To design as web page using front end technologies**

- **To develop application with server side scripting tools**

- **To develop web application with REST APIs and use of framework to communicate client-server applications.**

- **To build as responsive web application with managing NOSQL databases.**

MODULES	TEACHING HOURS
MODULE 1: Introduction to React	**10 Hrs**
Welcome to React: Obstacles and Roadblocks, React's future, keeping up with the changes, working with the files. The Basics-Introduction, Installation, getting started -hello world program, Lifecycle of Components, Understanding Functional & Class Components Passing Data.	
MODULE 2: React Components and Redux	**11 Hrs**
React Props, React state-setting state, Event handling, Designing components-state vs props An Introduction to Redux- Core Concepts, Reducer,Action,Action Creator, Combining Reducers,Store,Data Flow in Redux,Usage with React	
MODULE 3: Programming in Node.js	**11 Hrs**
Node.js Installation –getting started, Control flow, asynchronous pattern callback, Sequential functionality, nested callbacks and exception handling, asynchronous patterns and control flow. Routing Traffic, Serving Files and Middleware: Building a Simple Static File	

Server from Scratch, Middleware, Routers and Proxies	
MODULE 4: Expressing REST APIs	**10 Hrs**
REST-HTTP Methods as actions, Express-Routing, Handler Functions, The List API-automatic Server Restart, testing, Create API, Error Handling.	
MODULE 5: Module Title	**10 Hrs**
Introduction to MongoDB: -Installation-Databases, Data Types, Using MongoDB Shell. Creating, Updating, Deleting and Querying Documents: Inserting, removing, and updating the documents. Scheme Initialization, Reading and writing to Mongodb.	

Question Paper Pattern:

- **Each full question consists of 20 marks.**

- **Questions are set covering all the topics under each module**

TextBooks:

1. Tomasz Dyl Kamil Przeorski, "Mastering Full-Stack React Web Development", 2017 Packt Publishing

2. VasanSubramanian ,"ProMERN Stack",Apress,2018.

Reference Books

1. Eddy Wilson IriarteKoroliova ,"MERN-Full stack Development", Packt Publishing Ltd.,2018
2. ShamaHoque,"Full stack React Projects",Pack Publishing Ltd.,2018.

COURSE OUTCOMES (CO)

CO1: Demonstrate basic concepts of react, node, express and mongodbtechologies

CO2: Design front end application using React and Redux libraries.

CO3: Develop interactive web applications on server side with NOSQL databases.

CO4: Build responsive web application communicating with RES API and managing

   data with NOSQL databases.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(Cos)	Mapping with Program Outcomes(POs)
CO1	PO5,PO11
CO2	PO2,PO4,PO5,PO11
CO3	PO2,PO4,PO5,PO7,PO11

CO4	PO5,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					H						M	
CO2		M		H	H						L	
CO3		L		M	H		H				H	
CO4					M						H	

III SEMESTER BLOCKCHAIN TECHNOLOGY				
Course code:		**20MCA351**	**CIE Marks:**	**50**
Number of Lecture Hours per week:		**03**	**SEE Marks:**	**50**
Total number of Lecture Hours:		**39**	**SEE Hours:**	**3 Hrs**
Lecture (L): 3	**Practicals (P): 0**	**Tutorial (T): 0**	**Total Credits:**	**3**

COURSE LEARNING OBJECTIVES (CLO)

- **Designed to provide the conceptual understanding of the blockchain**
- **Learn the working technology of blockchain**
- **Understand the application scenarios of blockchain**
- **Implement blockchain in Ethereum technology**

MODULES	TEACHING HOURS
MODULE 1: Basis of Blockchain Technology Introduction to Blockchain, growth – Definition – Elements of Blockchain, Tiers, Types, Consensus, Decentralization: Methods of Decentralization, Routes to decentralization, Blockchain and full ecosystem decentralization	**8Hrs**
MODULE 2: Blockchain Mining Blockchain: The structure of block, The structure of block header, genesis block – Mining: Tasks, Rewards, Proof of Work, Mining Algorithm, Mining Systems: CPU, GPU, FGPA, ASIC- Mining Pools	**8 Hrs**
MODULE 3: Usecase - Financial Markets and Smart Contracts Trading, Exchanges, Trade Lifecycle, order anticipators, Market, Manipulation, Smart Contracts: Templates, Smart Oracles, Deploying smart contracts in Blockchain	**8 Hrs**
MODULE 4: Generic Use Cases BlockChain as Evidences – Digital Art -BlockChain Health–Blockchain Government	**8Hrs**
MODULE 5: Technology on Ethereum Ethereum blockchain, Ethereum network: mainnet, testnet, private net, components of Ethereum ecosystem, Ethereum Virtual Machine	**7 Hrs**

Question Paper Pattern:

- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

TextBooks

1. Mastering Blockchain, by Imran Bashir, II edition Packt Publications
2. BlockChain: Blueprint for a new economy, by Melanie Swan O'Reilly Publications

Reference Books

1. "BlockChain: A Beginners Guide", Authors: SherminVoshmgir, Valentin Kalinov Publisher: https://blockchainhub.net/
2. "Cryptocurrency and Bitcoin Technologies", Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder published by Princeton University press 2016

COURSE OUTCOMES (CO)

CO1:Understand the structure and underlying technology of blockchain

CO2:Analyze the application scenarios of blockchain

CO3: Apply the blockchain technology to build a blockchain system

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO1,PO3,PO7
CO2	PO3, PO7, PO10
CO3	PO3, PO4, PO5, PO7, PO10

LEVEL OF CO-PO MAPPING TABLE

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	PO9	PO10	PO11	PO12
CO1	M	H					L					
CO2			H				L			M		
CO3			H	L	M		L			M		

III SEMESTER
ARTIFICIAL INTELLIGENCE

Course code:				20MCA353		CIE Marks:	50
Number of Lecture Hours per week:				3		SEE Marks:	50
Total number of Lecture Hours:				39		SEE Hours:	3
Lecture (L):	3	Practical s (P):	0	Tutorial (T):	0	Total Credits:	3

COURSE LEARNING OBJECTIVES (CLO)

- **Identify the problems where AI is required and the different methods Available.**
- **Compare and contrast different AI techniques available.**
- **Define and explain learning algorithms.**

MODULES	TEACHING HOURS
MODULE 1: Introduction	**8Hrs**
Introduction to artificial intelligence, Course structure and policies, Historyof AIProposing and evaluating AI applications, Case study What is artificial intelligence?, Problems, Problem Spaces and search, Heuristic searchtechnique	
MODULE 2: Knowledge Representation	**8Hrs**
Issues, Using Predicate Logic, Representing knowledge using Rules, Problem spaces and search Knowledge and rationality, heuristic search strategies, Search and optimization (gradient descent) Adversarial search, Planning and scheduling	
MODULE 3: Symbolic Reasoning	**8Hrs**
under Uncertainty, Statistical reasoning,Weak Slot and Filter Structures, strong lot-and-filler structures, Game Playing	
MODULE 4: Fuzzy Logic and inference	**8Hrs**
Ontologies Bayesian reasoning Temporal reasoning Case study: Medical diagnosis	
MODULE 5: Natural Language Processing	**7Hrs**
Learning, Expert Systems, Case studies: Playing chess, Manufacturing scheduling	
Question Paper Pattern: • Each full question consists of 20 marks. • Questions are set covering all the topics under each module	
Text Books:	
1. E. Rich , K. Knight & S. B. Nair - Artificial Intelligence, 3/e, McGraw Hill.	
2. Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson	

	Education 2nd Edition
3.	Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India

Reference Books:

1.	Artificial Intelligence and Expert Systems Development by D W Rolston-Mc Graw hill.
2.	N.P. Padhy "Artificial Intelligence and Intelligent Systems" , Oxford University Press-2015

COURSE OUTCOMES (CO)

CO1: Identify the AI based problems

CO2: Apply techniques to solve the AI problems

CO3: Define learning and explain various learning techniques

CO4: Implement AI concepts in real time projects

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES

Course Outcomes (COs)	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO3, PO6
CO3	PO3, PO8, PO10
CO4	PO1,P03, PO9

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	M	H									
CO2	M		H		L							
CO3			H					M		L		
CO4	L		M						H			

III SEMESTER

MACHINE LEARNING USING PYTHON LAB

Sub Code:			20MCAL36	CIE Marks:	50
Number of Lecture Hours per week:			2	SEE Marks:	50
Total number of Lecture Hours:				SEE Hours:	3
Lecture (L):	0	Practical (P):	1	Tutorial (T): 0	Total Credits:	1

COURSE LEARNING OBJECTIVES (CLO)

- **To understand Pre-processing techniques and perform exploratory data analysis.**
- **Identify and apply Machine Learning algorithms to solve real world problems**
- **To develop skills of using recent machine learning software for solving practical problems**

Sl.No	Program
1.	Create a Data frame and demonstrate different ways to treat missing values.
2.	Implement Data Wrangling (Merge, Concatenate, Group) and Data Aggregation.
3.	a. Write a python program to read and write data into files (.CSV, .txt, .XLS). b. Perform exploratory data analysis (Head, Tail, Description, etc.) on any dataset.
4.	Implement Linear Regression using Python Script and identify explanatory variables.
5.	Write a program to demonstrate the working of the decision tree.
6.	Implement clustering technique for a given data set in python.
7.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored asa .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8.	Build an Artificial Neural Network by implementing the Back propagation algorithm and test thesame using appropriate data sets.

Note : Student has to pick one question from a lot of 8 questions

COURSE OUTCOMES (CO)

CO1: Implement exploratory data analysis, data visualization and different machine Learning Techniques to solve real world problems in Python.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO2, PO4, PO5, PO7,PO11

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO		L		M	M		S				S	

III SEMESTER
ADVANCES IN JAVA LAB

Sub Code:	**20MCAL37**	**CIE Marks:**	**50**
Number of Lecture Hours per week:	**02**	**SEE Marks:**	**50**
Total number of Lecture Hours:	**26**	**SEE Hours:**	**3 Hrs**

Lecture (L):		**Practicals (P):**	**02**	**Tutorial (T):**		**Total Credits:**	**1**

Course Learning objectives

- **Learn the fundamental of connecting to the database**

- **Demonstrate server side programming using Servlet , JSP, EJB.**

- **Design and develop web applications using Spring Framework.**

	List of Programs
1.	Demonstrate JDBC programs using MySQL and native database
2.	Demonstrate servlet program to handle form data

3.	Demonstrate servlet programs
	    i) Login and password validation using database
	    ii) Auto refreshing web page
	    iii) Using get or post method

4.	Develop a java servlet program using cookies
5.	Develop a java servlet program for session handling

6.	Develop a JSP program for
	    i) Implementing page directives
	    ii) Implementing action tags
	    iii) Implementing page directives

7.	Develop an application using JSP and JDBC
8.	Develop an application using JAVA bean and JSP
9.	Develop a java application using i) interface ii) packages
10.	Develop a sample application using Spring framework
11.	Develop JDBC application using Spring framework
12.	Develop MVC application using Spring framework

- **Note: In the practical Examination each student has to pick one question from a lot of all the 12 questions.**

COURSE OUTCOMES(CO):	
CO: Design and Develop real time applications using Advance java concepts	
COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES	
Course Outcomes(CO)	**Mapping with Program Outcomes(PO)**
CO	**PO1,PO2,PO4,PO5,PO8,PO11**

LEVEL OF CO-PO MAPPING TABLE												
CO/PO	PO1	PO	PO3	PO	PO	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	H	H	L	M	L			H			H	

III SEMESTER
MINI PROJECT

Course Code	20MCAM38	CIE Marks	50
Number of Practical Hours/Week	4	SEE Marks	50
Number of Instructional Hours/Week			
Total Number of Lecture Hours		SEE Hours	03
Lecture (L): 0	Practicals (P): 4	Tutorial (T): 0	Total Credits: 2

Course Learning Objectives:	
Students will develop an application using any latest tools and technologies learnt.	

MINI-PROJECT

Synopsis

- A team of two students must develop the mini project.

- Synopsis of the project must be submitted in the beginning of the 3rd semester

- The synopsis of the project must include:

  Problem formulation and literature survey.

  Details of the required tools and technologies for the development of project.

- Internal assessment shall be evaluated by the internal panel/guide for 50 marks.

 The team must submit a brief project report (25-30 pages)

 that must include the following

- ➢ Introduction
- ➢ Requirement Analysis
- ➢ Software Requirement Specification
- ➢ Analysis and Design
- ➢ Implementation
- ➢ Testing

The report must be evaluated for 10 Marks. Demonstration and Viva for 40 Marks.
 The project presentation and Viva-voce shall be evaluated jointly by both the internaland external examiners for 50 marks.

Course Outcome:

CO: Design and develop an applications for real world scenario.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)

CO	PO1,PO2,PO4,PO5,PO6,PO8,PO11											
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	L	M		S	M	M		S			S	

IV SEMESTER
PROJECT WORK

Course Code:			20MCAP42		CIE Marks:	50
Number of Lecture Hours per week:			-		SEE Marks:	50
Total number of Lecture Hours:			-		SEE Hours:	3
Lecture (L):	0	Practical (P):	4	Tutorial (T):	0	Total Credits:	20

Synopsis

➢ Synopsis of the project must be submitted before the end of the first month of 4ᵗʰ semester

➢ The synopsis of the project must include:

   a) Problem formulation and literature survey.

   b) Details of the required tools and technologies for the development of project.

   c) Write up shall not exceed 15 pages.

➢ Internal assessment for synopsis presentation and evaluation of the synopsis by the internal panel /guide is for 100 marks.

Dissertation:

➢ The project shall be carried out in the same institution or in industry/R&D labs based on software tools and technologies learnt in MCA course/internship for minimum period of 16 weeks.

➢ Internal assessment shall be evaluated by the internal panel/guide for **50** marks. For continuous evaluation of project work by the internal examiner/guide with progress reports is for 10 marks each. (3 progress reports x 10 marks= 30)

➢ Final presentation for the entire project is evaluated for 20 marks by the project Guide.

➢ The internal examiners (Project Guide with at least 3 years of experience) and the external examiners shall be appointed by the authorities of the college for the final evaluation of the project.

➢ Internal and external examiners shall carry out the evaluation of Dissertation report for **125** marks individually. The average of the marks allotted by the internal and external examiners shall be the final marks for the project Dissertation report evaluation.

➢ The project presentation and Viva-voce shall be evaluated jointly by both the internal and external examiners for **75** marks.

➢ The student shall publish the project outcome in the reputed journals.

Course Outcomes	
CO1	Analysis of project based on various parameters and resources and prepare Gantt chart.
CO2	Implement algorithms or techniques that contribute to the software solution of the project using different tools.
CO3	Analyse, interpret, test and validate experimental results.
CO4	Develop research/technical report with enhanced writing /communication skills following ethical practices.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO2,PO3,PO4
CO2	PO1,PO2,PO3,PO4,PO5,PO7,PO8
CO3	PO4,PO5,PO7,PO8,PO10,PO11
CO4	PO4,PO5,PO7,PO8,PO9,PO10,PO11,PO12

LEVEL OF CO-PO MAPPING TABLE

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	H	H								
CO2	L	L	M	M	H		H	H		M		
CO3				H	M		H	H				H
CO4				H	M		H	H	H		H	H

Dr. Ambedkar Institute of Technology, Bengluru-56

(An Autonomous Institute, Approved by AICTE, Affiliated to V T U, Belagavi)
Nationally Accredited by NAAC with 'A' Grade

Master of Computer Applications

(Accredited by National Board of Accreditation)

Syllabus copy of the courses highlighting the focus on employability/ entrepreneurship/ skill development along with their course outcomes.

Syllabus (2018-21)

Panchajanya Vidya Peetha Welfare Trust (Regd)

Dr. Ambedkar Institute of Technology

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BDA Outer Ring Road, Mallathalli, Bengaluru - 560 056

Ref. No. Dr. AIT | MCA | 356 | 2022-23   Date : 06. 01. 2023

The following courses has content with direct bearing on Employability/ Entrepreneurship/ Skill development in the scheme 2018-21.

Sl.No	Subject Code	Subject Name	Content on Employability/ Entrepreneurship/ Skill development	Year
1.	18MCA11	OOPS using C++	Skill Development	2018-19
2.	18MCA12	Linux Programming	Skill Development	2018-19
3.	18MCA13	Web Technologies	Skill Development	2018-19
4.	18MCAL16	OOPS Lab	Employability	2018-19
5.	18MCAL17	Linux Lab	Employability	2018-19
6.	18MCAL18	Web Technology Lab	Employability	2018-19
7.	18MCA21	Java Programming	Skill Development	2018-19
8.	18MCAL26	Java Programming Lab	Employability	2018-19
9.	18MCAL27	Data Structures Lab	Employability	2018-19
10.	18MCAL28	DBMS lab	Employability	2018-19
11.	18MCA32	Python Programming	Skill Development	2018-19
12.	18MCA34	Data Science using R	Employability	2018-19
13.	18MCAL37	Python programming Lab	Employability	2018-19
14.	18MCAL38	Data Science using R Lab	Employability	2018-19
15.	18MCA351	Software Testing and Practices	Employability	2018-19
16.	18MCA352	Advanced DBMS	Employability	2018-19

Signature of the BOS Chairman   Signature of the Principal

Ref. No. Dr·AIT|MCA|356|2022-23   Date : 06·01·2023

Sl.No	Subject Code	Subject Name	Content on Employability/ Entrepreneurship/ Skill development	Year
17.	18MCA353	Artificial Intelligence	Employability	2018-19
18.	18MCA41	Enterprise Applications-1	Employability	2018-19
19.	18MCA42	Advanced Web Technologies	Employability	2018-19
20.	18MCA441	Information Security	Employability	2018-19
21.	18MCA442	Data Mining & Business Intelligence	Employability	2018-19
22.	18MCA443	Object-oriented Modelling & Design	Employability	2018-19
23.	18MCA451	Software Quality & Performance Evaluation	Employability	2018-19
24.	18MCA452	Software Architecture	Employability	2018-19
25.	18MCA453	Enterprise Resource Planning	Employability	2018-19
26.	18MCAL47	Enterprise Applications Lab	Skill development	2018-19
27.	18MCAL48	Advanced Web Technologies Lab	Skill development	2018-19
28.	18MCAM49	Mini Project using Android	Skill development	2018-19
29.	18MCA51	Machine Learning using Python	Employability	2018-19
30.	18MCA52	Big Data Analytics	Employability	2018-19
31.	18MCA53	Cloud Computing	Employability	2018-19
32.	18MCA541	Enterprise Application-2	Employability	2018-19
33.	18MCA542	Full Stack Development with MERN	Employability	2018-19

Signature of the BOS Chairman   Signature of the Principal

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Ref. No. Dr.AIT/MCA/356/2022-23   Date : 06.01.2023

Sl.No	Subject Code	Subject Name	Content on Employability/ Entrepreneurship/ Skill development	Year
34.	18MCA543	DevOps	Employability	2018-19
35.	18MCA551	Web Services	Employability	2018-19
36.	18MCA552	Internet of Things	Employability	2018-19
37.	18MCA553	Block Chain Technology	Employability	2018-19
38.	18MCAL56	Machine Learning Using Python Lab	Skill Development	2018-19
39.	18MCAL57	Big Data Analytics Lab	Skill Development	2018-19
40.	18MCAL58	Cloud Computing Lab	Skill Development	2018-19
41.	18MCAI61	Internship	Employability	2018-19
42.	18MCAP62	Project Work	Employability	2018-19

Signature of the BOS Chairman   Signature of the Principal

SEMESTER-I			
Web Technologies			
Subject Code	**18MCA13**	**CIE Marks**	**50**
Number of Lecture Hours/Week	**4**	**SEE Marks**	**50**
Total Number of Lecture Hours	**52**	**SEE Hours**	**03**
CREDITS – 4:0:0			

Course Learning Objectives(CLO):

- Demonstrate the underlying principles, methods and approaches of Web technologies.
- Understand XHTML tags and CSS style sheets.
- Build Java script and different event handlers in java script.
- Demonstrate dynamic document using java script and XML.
- Use jQuery to develop dynamic and interactive web page.

Modules	Teaching Hours
Module -1	**9 Hours**
Web Fundamentals Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, and the Web Programmers Toolbox. Introduction to XHTML Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML.	
Module -2	**12 Hours**
Introduction to HTML5 New features of HTML5, HTML5 DocType, HTML5 Structure, Tags- nav, section, article, aside, header, footer, HTML5 Form Elements- Search, tel, url, email, number and range, HTML5 Media tags- Audio and video. **Cascading Style Sheets** Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color Alignment of text, The box model, Background images, The and tags, Conflict resolution.	
Module -3	**10 Hours**
The basics of JavaScript Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts. **JavaScript and XHTML Documents**	

The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model, The navigator Object, Dom Tree Traversal and Modification.	
Module -4	**12 Hours**
Dynamic Documents with JavaScript Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements **Introduction to XML Introduction** Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, Web services.	
Module -5	**9 Hours**
Introduction to jQuery Introducing jQuery, jQuery fundamentals, Creating the wrapped element set, Bringing pages to life with jQuery, Understanding the browser event models, The jQuery Event Model, Sprucing up with animations and effects.	

Question paper pattern:

- There will be 10 questions with 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions, selecting ONE from each module.

Text Books:

1. Robert W.Sebesta ,"Programming the World Wide Web", 4thEdition, Pearson education, 2012.
2. Kogent Learning solutions Inc., "HTML 5: Covers CSS3, JavaScript,XML, XHTML AJAX, PHP & JQuery: Black Book", Dreamtech Press.
3. Bear Bibeault, Yehuda Katz: jQuery in Action. 3rd Edition, DreamTech India,2008.

Reference Books:

1. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 2nd Edition, Pearson, 2018.
2. Jeffrey C.Jackson: Web Technologies-A Computer Science Perspective, Pearson Education, 7 th Impression, 2012.
3. Chris Bates: Web Programming Building Internet Applications, 3rdEdition, WileyIndia, 2009.
4. Zak Ruvalcaba Anne Boehm, "Murach's HTML5 and CSS3", 3rd Edition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016.

COURSE OUTCOMES:

CO1: Understand the fundamentals of web and outline the features.

CO2: Design a web page with media components using HTML5 and CSS.

CO3: Develop XML documents and display using CSS.

CO4: Design and develop dynamic and interactive web pages using JavaScript and jQuery.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO 1	PO5,PO11
CO 2	PO5,PO11
CO 3	PO4,PO5,PO7,PO11
CO 4	PO2,PO4,PO5,PO11

<table>
<tr>
<td colspan="4" align="center">**SEMESTER –I**

<u>Web Technologies Lab</u></td>
</tr>
<tr>
<td>**Laboratory Code**</td>
<td>**18MCAL18**</td>
<td>**CIE Marks**</td>
<td>**50**</td>
</tr>
<tr>
<td>**Number of Lecture Hours/Week**</td>
<td>**02**</td>
<td>**SEE Marks**</td>
<td>**50**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>**SEE Hours**</td>
<td>**03**</td>
</tr>
<tr>
<td colspan="4" align="center">**CREDITS – 0:0:1**</td>
</tr>
<tr>
<td colspan="4">**Course Learning Objectives(CLO):**

• To develop web pages using HTML and HTML5.
• To demonstrate the usage of CSS in designing web pages.
• To execute simple programming questions using JavaScript.
• To create dynamic web pages by manipulating the DOM elements.
• To design and implement user interactive dynamic web based applications using jQuery.</td>
</tr>
<tr>
<td>1</td>
<td colspan="3">Create an XHTML page that provides information about your department. Your XHTML page must use the following tags: a) Text Formatting tags b) Horizontal rule c) Meta element d) Links e) Images f) Tables (Use of additional tags encouraged).</td>
</tr>
<tr>
<td>2</td>
<td colspan="3">Develop and demonstrate the usage of inline, external and internal style sheet using CSS. Use XHTML page that contains at least three paragraphs of text, listed elements and a table with four rows and four columns.</td>
</tr>
<tr>
<td>3</td>
<td colspan="3">Develop and demonstrate a XHTML file that includes Javascript script for the following problems: a) Input : A number n obtained using prompt Output : The first n Fibonacci numbers b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert</td>
</tr>
<tr>
<td>4</td>
<td colspan="3">Write a JavaScript program to generate n number of random numbers and store them in an array. Sort the generated numbers in ascending order using array sort method. Develop separate functions to find mean and median of numbers that are in the array. Display the results with appropriate messages.</td>
</tr>
<tr>
<td>5</td>
<td colspan="3">Create a XHTML document that describes the form for taking orders for popcorn. Text boxes are used at the top of the form to collect the buyer's name and address. These are placed in a borderless table to force the text box align vertically. A second table to collect actual order. Each row of this table names a product, displays the price, and uses text box with size 2 to collect the quantity ordered using <td> tag. The payment method is input by the user through one of four radio buttons. Provide provision for submission of order and clear the order form.
    Sample Output</td>
</tr>
</table>

Welcome to Millennium Gymnastics Booster Club Popcorn Sales

Buyer's Name: [   ]
Street Address: [   ]
City, State, Zip: [   ]

Product Name	Price	Quantity
Unpopped Popcorn (1 lb.)	$3.00	[ ]
Caramel Popcorn (2 lb. canister)	$3.50	[ ]
Caramel Nut Popcorn (2 lb. canister)	$4.50	[ ]
Toffey Nut Popcorn (2 lb. canister)	$5.00	[ ]

Payment Method:

⦿ Visa ○ Master Card ○ Discover ○ Check

[Submit Order]   [Clear Order Form]

6	Develop, test and validate an XHTML document that has checkboxes for apple (59 cents each), orange (49 cents each), and banana (39 cents each) along with submit button. Each checkboxes should have its own onclick event handler. These handlers must add the cost of their fruit to a total cost. An event handler for the submit button must produce an alert window with the message 'your total cost is $xxx', where xxx is the total cost of the chose fruit, including 5 percent sales tax. This handler must return 'false' (to avoid actual submission of the form data). Modify the document to accept quantity for each item using textboxes.
7	a) Develop and demonstrate, a HTML document that collects the USN (the valid format is : A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by three upper-case characters followed by two digits; (no embedded spaces are allowed) from the user. Use JavaScript that validate the content of the document. Suitable messages should be display in the alert if errors are detected in the input data. Use CSS and event handlers to make your document appealing. b)Modify the above program to get the current semester also(restricted to be a number from 1 to 6)
8	Develop and demonstrate a HTML5 page which contains a) Dynamic Progressive bar. b) Display Video file using HTML5 video tag.
9	Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. Modify the above document so that when a text is movedfrom the top stacking position, it returns to its original position rather than to the bottom
10	Develop a simple calculator to perform arithmetic (addition, subtraction, multiplication and division) operations on given two numbers. Use an html tag that allows the user to input two numbers and to display the result of arithmetic operation. Write suitable HTML and JavaScript and CSS to your simple calculator. The following figure show sample document display.

	Modify your program to make HTLM document as eye-catching using CSS..
	A SIMPLE CLACULATOR Number 1 = 10 Number 2 = 5 Result = 2 [ADD] [SUB] [MUL] [DIV] [CLEAR]
11	Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
12	Develop and demonstrate using jQuery to solve the following: a) Limit character input in the text area including count. b) Based on check box, disable/enable the form submit button.
Note 1: In the practical Examination each student has to pick one question from a lot of all 12 Questions	
Course Outcomes(CO): **CO1:** Design and implement user interactive dynamic web based applications using XHTML5,CSS, JAVA SCRIPT,XML & jquery	

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO 1	PO1,PO2,PO4,PO5,PO11

SEMESTER –II **JAVA PROGRAMMING**			
Subject Code	**18MCA21**	CIE Marks	**50**
Number of Lecture Hours/Week	**4**	SEE Marks	**50**
Total Number of Lecture Hours	**52**	SEE Hours	**03**
CREDITS – 4:0:0			
Course Learning Objectives(CLO): • Understand the different object oriented concepts and implement basic programs. • Develop applications using inheritance and interface concepts.			

- Apply multithreading programming concepts and handling errors efficiently.
- Design client server application in java

Modules	Teaching Hours
Module -1	**11 Hours**
Java Programming Fundamentals The Java Language, The Key Attributes of Object-Oriented Programming, The Java Development Kit, A First Simple Program, Handling Syntax Errors, The Java Keywords, Identifies in Java, The Java Class Libraries. **Introducing Data Types and Operators** Java's Primitive Types, Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, operators, Shorthand Assignments, Type conversion in Assignments, Using Cast, Operator Precedence, Expressions. **Program Control Statements** Input characters from the Keyword, if statement, Nested ifs, if-else-if Ladder, Switch Statement, Nested switch statements, for Loop, Enhanced for Loop, While Loop, do-while Loop, Use break, Use continue, Nested Loops**.** **More Data Types and Operators** Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The For-Each Style for Loop, Strings, The Bitwise operators. **String Handling** String Fundamentals, The String Constructors, Three String-Related Language Features, The Length () Method, Obtaining the characters within a string, String comparison, using indexOf() and lastIndexOf(), Changing the case of characters within a string, String Buffer and String Builder.	
Module -2	**11 Hours**
Introducing Classes, Objects and Methods Class Fundamentals, How Objects are Created, Reference Variables and Assignment, Methods, Returning from a Method, Returning Value, Using Parameters, Constructors, Parameterized Constructors, The new operator Revisited, Garbage Collection and Finalizers, The this Keyword. **A Closer Look at Methods and Classes** Controlling Access to Class Members, Pass Objects to Methods, How Arguments are passed, Returning Objects, Method Overloading, Overloading Constructors, Recursion, Understanding Static, Introducing Nested and Inner Classes, Varargs: Variable-Length Arguments. **Inheritance**	

Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Why Overridden Methods, Using Abstract Classes, Using final, The Object Class.	
Module -3	**10 Hours**
Interfaces Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Final Thoughts on Interfaces. **Packages** Package Fundamentals, Packages and Member Access, Importing Packages, Static Import **Exception Handling** The Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, Exceptions Enable you to handle errors gracefully, using Multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, Throwing an Exception, A Closer look at Throwable, using finally, using throws, Java's Built-in Exceptions, New Exception features added by JDK 7, Creating Exception Subclasses.	
Module -4	**10 Hours**
Multithreaded Programming Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, using Synchronization Methods,The Synchronized Statement, Thread Communication using notify(), wait() and notify All(), suspending, Resuming and stopping Threads. **Enumerations, Auto boxing and Annotations** Enumerations, Java Enumeration are class types, The Values () and Valueof() Methods, Constructors, methods, instance variables and enumerations, Auto boxing, Annotations (metadata), **Generics** **Applets** Applet basics, A complete Applet Skeleton, Applet Initialization and Termination, A key Aspect of an Applet Architecture, Requesting Repainting, using the status window, Passing parameters to Applets.	
Module -5	**10 Hours**
Networking with Java.net Networking fundamentals, The Networking classes and Interfaces, The InetAddress class, The Socket Class, The URL class, The URLConnection Class, The HttpURL Connection Class.	

Exploring Collection Framework

Collections Overview, The Collection Interfaces, The collection Classes. The Arrays Class.

Question paper pattern:

- There will be 10 questions with 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions, selecting ONE from each module.

Text Books:

1. Java Fundamentals, A comprehensive Introduction by Herbert Schildt, Dale Skrien. Tata McGraw Hill Edition 2013.

Reference Books:

1. Java Programming by Hari Mohan Pandey, Pearson Education, 2012.

2. Java 6 Programming, Black Book, KoGenT ,Dreamtech Press, 2012.

3. Java 2 Essentials, Cay Hortsmann, second edition, Wiley

Course Outcomes(CO):

CO1: Demonstrate the basic object oriented concepts & apply them to create java applications.

CO2: Apply   inheritance and interface concepts to design java applications.

CO3: Design java applications with multithreading concepts and demonstrate the error handling concepts.

CO4: Design client server applications.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO 1	PO1,PO2,PO3,PO4,PO5,PO7,PO12
CO 2	PO1,PO2,PO3,PO5,PO7,PO9
CO 3	PO1,PO2,PO3,PO5,PO7,PO9
CO 4	PO1,PO2,PO4,PO5,PO7,

Python Programming

Subject Code	18MCA32	CIE Marks	50
Number of Lecture Hours/Week	4	SEE Marks	50
Total Number of Lecture Hours	52	SEE Hours	03

CREDITS – 4:0:0

Course Learning Objectives (CLO):

- To describe the Fundamentals of Python
- To demonstrate the python data structure
- To implement files and data base connectivity and object oriented programing
- To develop Web applications using python

Modules	Teaching Hours
Module -1	**10Hours**
Overview of Python Introduction to Python: Features of Python, Execution of a Python Program, Viewing the Byte Code, Flavors of Python, Python Virtual Machine (PVM, Frozen Binaries, Memory Management in Python, Garbage Collection in Python, Comparisons between C and Python. Datatypes in Python, operators and I/O Statements: Comments in Python, User-defined Datatypes, Output statements, Input Statements Control Statements: Functions: Pass by Object Reference, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Anonymous Functions or Lambdas,	
Module -2	**10 Hours**
Exception Handling and Regular expressions Exceptions: Errors in a Python Program, Exceptions, Exception Handling, Types of Exceptions, -The Except Block, The assert Statement, User-Defined Exceptions. Regular Expressions: Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files, Retrieving Information from a HTML File.	
Module -3	**12 Hours**

Python Data Structure	
Strings and Characters: Creating Strings, Length of a String, Indexing in 10 Strings, Slicing the Strings, Repeating the Strings, Concatenation of Strings, Hours String Methods, Lists, Tuples and Sets: , Nested Lists as Matrices, List Comprehensions, Tuples, Dictionaries: Operations on Dictionaries, Dictionary Methods, , Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Ordered Dictionaries. Using zip() Function, Sets, Set Methods, Traversing of Sets,	
Module -4	**10 Hours**
Files and database Connectivity Files: Types of Files in Python, Opening a File, Closing a File, Working with 10 Text Files Containing Strings, Knowing Whether a File Exists or Not, Hours Working with Binary Files, The with Statement, Pickle in Python, The seek() and tell() Methods, Python's Database Connectivity: Types of Databases Used with Python, Working with MySQL Database, Using MySQL from Python, Retrieving All Rows from a Table, Inserting Rows into a Table, Deleting Rows from a Table, Updating Rows in a Table, Creating Database Tables through Python	
Module -5	**10 Hours**
Object Oriented Programming Concepts OOP in Python: Specialty of Python Language, Creating a Class, The Self 10 Variable, Constructor, Types of Variables, Namespaces, Types of Methods, Hours Passing Members of One Class to Another Class, Inner Classes. Inheritance and Polymorphism, Constructors in Inheritance, Overriding Super Class, Constructors Inheritance, Overriding Super Class, Constructors and Methods, The super() Method, Types of Inheritance, Method Resolution Order (MRO), Polymorphism, Operator Overloading, Method Overloading, Method Overriding, Abstract Classes and Interfaces, Abstract Method and Abstract Class, Interfaces in Python, Abstract Classes vs. Interfaces. **Introduction to Networking concepts in python** Python Network services, socket program, simple networking programs.	

Question paper pattern:

- The question paper will have five questions. All questions are compulsory. Module 1 and 5 shall have internal choice.
- Each full question consists of 20 marks. Questions are set covering all the topics under a each module.

Text Books:

1. Core Python Programming: 2017 Edition, R. Nageswara Rao, DreamTech Publication.
2. Exploring Python, Timothy A. Budd, Mc Graw Hill Education
3. Introduction to Python Programming , Gowrihankar S, Veena A, CRC Press/Tyler and Francies.
4. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.

Reference Books:
1. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr.
2. Python for Informatics: Exploring Information, Charles Severance.
3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication.

Course Outcome (CO):

CO1: Understand the Fundamentals of Python programming

CO2: Demonstrate various features of python programming for building Applications.

CO3: Apply python programming for designing the applications efficiently.

CO4: Design and Develop applications to be deployed in real world scenarios.

SEMESTER – III

Data Science using R

Subject Code	18MCA34	CIE Marks	50
Number of Lecture Hours/Week	3	SEE Marks	50
Total Number of Lecture Hours	39	SEE Hours	03

CREDITS – 3:0:0

Course Learning Objectives (CLO):

- To understand the concepts of Data science
- To analyse the sampling techniques for data classification.
- To implement modeling methods for machine learning problems
- Analyzing data from files and Visualizing graphical presentations using R

Modules	Teaching Hours
Module -1	**8 Hours**
DATA SCIENCE PROCESS Introduction, Evolution of data science, Data science process – roles, stages in data science project – components of the Data Science lifecycle, data analytics, exploring data – managing data – cleaning and sampling for modeling and validation	

Module -2	8 Hours
EXPLORING R BASICS Introduction, R features basic data types, Vectors, Lists ,Arithmetic, logical & Matrix Operations, Control structures, Functions in R, Data frames ,Reading Data & cleaning data Data visualization techniques –Histograms, box plot, bar chart, scatter plot.	
Module -3	**7 Hours**
STATISTICAL MEASURES IN R Understanding Descriptive statistics, standard deviations, probability distribution, Normal distribution-Skewness, kurtosis, Inferential statistics-Hypothesis testing- t-test -One Sampled t-test, Correlation -Person correlation coefficient.	
Module -4	**8 Hours**
DATA SCIENCE ALGORITHMS Classification of Regression Analysis, Regression process, Linear Regression, Understanding Linear regression, making prediction-hypothesis on regression coefficients, multiple Linear Regression, concepts and formulas, Logistic regression, Model building and making predictions, Adding best fit.	
Module -5	**8 Hours**
MODELLING TECHNIQUES Classification techniques-Decision Trees, K Nearest Neighbor classification Technique. Implementation in R Clustering techniques, Applications, k-means Clustering algorithm, Performance of k-means, choosing Initial centroid- Implementation in R, Efficiency using Confusion matrix	

Question paper pattern:

- There will be 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions selecting ONE from each module.

Text Books:

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
2. David Dietrich , Barry Heller ,"Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data",Wiley,2015
3. Joseph Schmuller, "Statistical Analysis with R", John Wiley, 2017.

Reference Books:

1. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison- Wesley, 2005

Course Outcomes(CO):

CO 1: Understand role and process of Data Science.
CO 2: Apply exploratory methods for statistical modeling and analysis using R.
CO 3: Analyse modelling methods and interpret the results visually.
CO 4: Construct use cases to validate approach and identify modifications required.

SEMESTER – III			
Software Testing And Practices			
Subject Code	**18MCA351**	CIE Marks	**50**
Number of Lecture Hours/Week	**3**	SEE Marks	**50**
Total Number of Lecture Hours	**39**	SEE Hours	**03**
CREDITS – 3:0:0			

Course Learning Objectives (CLO):

- The process of Software Testing Life Cycle and Types of Testing
- Differentiate between Manual Testing and Automation in Testing.
- Design Test Cases using the testing tool Selenium IDE and Web Driver
- Identify different web Elements and apply them to design test cases

Modules	Teaching Hours
Module -1	**7 Hours**
Introduction To Testing Introduction and Fundamentals of Testing, Myths and Facts of Software Testing, Quality Assurance and Quality Control, Testing Objectives, Software Testing Life Cycle (STLC), Test Planning, Test-case Design Technique. Types of Testing- White Box testing, Black Box Testing, Integration Testing, Regression Testing, Validation Testing, Alpha Testing, Beta Testing, Acceptance Testing. Defect Management: Defect Management Process, JIRA Defect Tracking Tools.	
Module -2	**8 Hours**
Overview Of Selenium Software Test Automation: Fundamentals of Test Automation, Manual Testing Vs Test Automation, Terms used in Automation, Skills needed for Automation, Scope of Automation, Challenges in Automation. Selenium –WebDriver: Introduction to WebDriver , Installation of Selenium WebDriver, Creating the Scripts in WebDriver, Web Element Locators, Xpath , id, LinkText, CSS Selector, Class Name, TagName WebDriver Commands: Browser Commands, getUrl(), getTitle(), getPageSource(),close(),Quit(), Navigation Commands, backward(0,forward(),to(),refresh() WebElements Commands, Isselected(), IsEnabled(), getAttribute(), getText(),notify(), sendKeys(), submit(), wait().	

Module -3	8 Hours
Handling Webelements CheckBox and Radio Button Operation, DropDown and Multiple select Operations, Handle Alert in WebDriver : dismiss(), accept(), getText(), sendKey(), Popup window handling in Web Drivers, getWindowHandle(), Wait commands in Web Drivers, Mouse Event using Action commands, Handling Multiple Windows, and IFrames, Running Test in Invisible Mode, Handling Dynamic Web Pages. Running selenium Web Driver in different popular Browser	
Module -4	8 Hours
Application Programming Interface(API) Testing Introduction, API testing types, Command, tests on APIs, Advantages, Tasks involved, Tools used for API Testing, Challenges, Best Practices, Case study, Database Testing, Security Testing	
Module -5	8 Hours
Advanced Topics on Testing Cross Platform Testing, coding standard overview, code coverage metrics, code freeze, code Inspection, code Review, code walkthrough, code based testing, code driven Testing, CUCUMBER Framework, Test Driven development, Behavioral driven Development.	

Question paper pattern:

- There will be 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions selecting ONE from each module.

Text Books:

1. Rex Black: Advanced Software Testing—Vol. 1, Shroff Publishers, 2011.

2. Srinivasan Desikan Gopalaswamy: Software Testing Principles and Practices, 5th Edition, Pearson Education, 2007.

3. Paul C. Jorgensen: Software Testing A Craftman's Approach, 3rd Edition, Auernac Publications, 2008

4. David Burns: Selenium 2 Testing Tools: Beginner's Guide, Packt Publishing, 2012.

Reference Books:

1. Rex Black: Advanced Software Testing—Vol. 2, Shroff Publishers, 2011.
2. Gundecha Unmesh: Selenium Testing Tools Cook Book, PACKT PUBLISHING, 2012.

Course Outcomes(CO):

CO 1: Analyze the process of Software Testing Life Cycle and types of Testing.

CO 2: Demonstrate Manual Testing and Automation in Testing

CO 3: Design Test Cases for User Interface Testing

CO 4: Design Test Cases for Application Programming Interface (API) Testing and Data base Testing

SEMESTER – III			
Artificial Intelligence			
Subject Code	**18MCA353**	CIE Marks	**50**
Number of Lecture Hours/Week	**3**	SEE Marks	**50**
Total Number of Lecture Hours	**39**	SEE Hours	**03**
CREDITS – 3:0:0			

Course Learning Objectives (CLO):

- Identify the differences between knowledge representation and knowledge organization.
- Understand about Robotics and structure
- Learn different search strategies and fuzzy methodology
- Representation of knowledge and reasoning
- Evaluate knowledge about planning and learning strategies

Modules	**Teaching Hours**
Module -1	**7 Hours**
Artificial Intelligence Introduction: over view of AI, Importance of AI, AI- History, AI and related fields, search control strategy: preliminary concepts, AI-Applications, Turing Test, Application areas, Problem Space, Problem Characteristics, and AI Problems.	
Module -2	**8 Hours**
Fundamentals Of Robotics Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot-Robot joints and links-Robot classifications-Architecture of robotic systems-Robot Drive systems	
Module -3	**8 Hours**
Fuzzy Logic Introduction, fuzzy set theory, classical sets, membership function, fuzzy rule generation, compliment, Intersections, Unions, combinations of operations, Aggregation operations. Fuzzy number, Linguistic variables, arithmetic operations on intervals and numbers, lattice of fuzzy numbers, fuzzy equations, fuzzy relations, fuzzy projections, fuzzy systems, fuzzy propositions, fuzzy inference, fuzzyfications, and defuzzification.	
Module -4	**8 Hours**
Probabilistic Reasoning Bayesian probabilistic inference, Bayes Theorem, Knowledge based system, representation of knowledge origination, knowledge manipulation	
Module -5	**8 Hours**
Planning And Natural Language Processing Introduction, Components of a Planning System, Goal Stack Planning, Hierarchical Planning. Linguistics, grammars and languages. Basic parsing techniques, expert system architecture, characteristics of expert systems, Rules for Knowledge in Language Understanding, Syntax and Semantic Analysis, NLP.	

Question paper pattern:

- There will be 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions selecting ONE from each module.

Text Books:

1."Artificial Intelligence-A modern Approach" Stuart Russel, Peter Norvig, second

   edition, PHI/Pearson Education, 2010

2. Artificial Intelligence – Structures and Strategies for Complex Problem Solving,

   George F. Luger, Pearson Education, 4/e, 2003.

3. Thimothi and Ross: Engineering Applications Fuzzy Fuzzy logic, PHI.

Reference Books:

1. Artificial Intelligence and Intelligent Systems, N. P. Padhy, Oxford Press, 4/e, 2008.

2. Artificial Intelligence: A new Synhesis Approach, Nils J. Nilson, Morgan Kaufmann, 1998.

3.G.J.Klir and B.Yuan: Fuzzy sets and Fuzzy logic, PHI, 1995

Course Outcomes(CO):

CO 1: Understand of Artificial intelligence concepts.
CO 2: Apply different Search strategies in problem solving
CO 3: Discover knowledge and perform reasoning.
CO 4: Derive planning strategies and machine learning techniques

ENTERPRISE APPLICATIONS SEMESTER – IV			
Subject Code	18MCA41	**CIE Marks**	50
Number of Lecture Hours/Week	3	**SEE Marks**	50
Total Number of Lecture Hours	39	**SEE Hours**	03
CREDITS – 3:0:0			

Course Learning objectives(CLO):

- Present J2EE concepts and designing database access with java applications.
- Introduce the concepts of server side programming using Servlets & JSP.
- Present different types of enterprise java beans and implement them.
- Design and developing an application using spring and Hibernate frame work.

Modules	Teaching Hours
Module -1	
Annotations and JDBC Creating Packages, Interfaces, JAR files and Annotations. The core java API package, New java.Lang Sub package, Built-in Annotations with examples. The Concept of JDBC, JDBC Driver types, A brief overview of JDBC process, Database Connection, Statement objects, ResultSet, Transaction Processing, Metadata, Datatypes, Exceptions. Introduction to Embedded SQL with JDBC.	**07 Hours**
Module -2	**8 Hours**
Servlet and JSP and Controlling the Structure of generated servlets J2EE Architecture,Servlet Structure, Servlet packaging, HTML building utilities, Lifecycle, SingleThreadModel interface, Handling Client Request: Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies, Session Tracking.	
Module -3	**8 Hours**
JSP and Controlling the Structure of generated servlets Overview of JSP: JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic syntax. Invoking java code with JSP scripting elements, creating Template Text, Invoking java code from JSP, Limiting java code in JSP, using jsp expressions, comparing servlets and jsp, writing scriptlets. For example Using Scriptlets to make parts of jsp conditional, using declarations, declaration example. Controlling the Structure of generated servlets: The JSP page directive, JSP Action tags.	
Module - 4	**6 Hours**
Java Beans Working with Java Beans. Introspection, creating java bean, manifest file, Bean Jar file, adding controls, Bean properties, Simple properties, bound properties, Icon, Bean info class, Constrained Properties, Persistence, Java Beans API. **EJB and Server Side Component Models** Enterprise Java Beans: The EJB Container, EJB Classes, EJB Interface. Deployment Descriptor, Session Java Bean, Entity Java Bean, Message-Driven Bean, The JAR File.	
Module – 5	**10 Hours**

Spring Framework

Introduction to Spring Framework, Spring Framework architecture,

IOC-containers, Bean scopes, Bean Life cycle, Dependency Injection, Beans wiring, Event Handling in springs, Custom events in springs Spring AOP, and Spring JDBC.

Spring MVC

Spring MVC : Spring 3.0 features –Introduction to Spring MVC –Handler Mapping – Controllers –Validations –Handler Interceptors –Views –Form tags.

Question paper pattern:

- There will be 10 questions with 2 full questions from each module.
- Each full question consists of 20 marks. Students have to answer 5 full questions, selecting ONE from each module.

Text Books:

1. Marty Hall, Larry Brown. Core Servlets and Java Server Pages. Volume 1: Core Technologies. 2nd Edition. (Chapter 3,4,5,6,7,8,9,10,11,12,13,14).
2. Java 6 Programming Black Book, Dreamtech Press. 2012 (Chapter 17,18,19,20,21,22,27,28,29,30).
3. Andrew LeeRubinger, Bill Burke. Developing Enterprise Java Components. Enterprise JavaBeans 3.1.O'reilly. (Chapter 1,2,3,4,5,6,7,8,9,10,11).

Reference Books:

1. Michael Sikora, EJB 3 Developer Guide, A practical guide for developers and architects to the Enterprise Java Beans Standard, Shroff Publishers & Distributors PVT LTD. July 2008.
2. Herbert Schildt, Java The Complete Reference, 8th Edition. Comprehensive coverage of the Java Language. Tata McGraw-Hill Edition – 2011.

Course Outcomes(CO):

CO1: Understand Concept of enterprise applications programming.

CO2: Analyze the methodologies and constraints of implementation.

CO3: Apply the enterprise programming methodologies to design

applications.

CO4: Design and Develop applications to be deployed in real world scenarios.

Advanced Web Technologies

Subject Code	**18MCA42**	CIE Marks	**50**
Number of Lecture Hours/Week	**3**	SEE Marks	**50**
Total Number of Lecture Hours	**39**	SEE Hours	**03**

CREDITS – 3:0:0

Course Learning Objectives (CLO):

- To design web pages using Bootstrap framework
- To develop different approaches of Web technologies using PHP and Ruby on Rails.
- To design Single page web applications using AngularJs
- To design asynchronous web applications using Ajax.

Modules	**Teaching Hours**
Module -1	**8 Hours**
Bootstrap- Introduction, **Layout**: Container, Grid, **Components**: Alerts, Badge, Card, Jumbotron, Buttons/Buttons group, Navs/Navbar, Pagination, Modal, Carousel, Collapse, Form, Input group, Progress bar	
Module -2	**8 Hours**
Introduction to PHP-Origins and uses of PHP, Overview of PHP, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files handlers. Building Web applications with PHP- Using databases, tracking users- cookies, sessions.	
Module -3	**8 Hours**
Ajax- AJAX principles, Creating Ajax applications, Adding Server-side programming, Sending data to the server using GET and POST. Downloading JavaScript, Connecting to Google suggest. Ajax Patterns-Periodic fetch, Periodic refresh, case study.	
Module -4	**8 Hours**
Angular JS -Single Page Applications: -Introduction, MVC Architecture, Data binding, binding with lists, Angular Directives, Controller, Dependencies, Bootstrapping an angular applications, scope and views.	
Module -5	**7 Hours**
NodeJs-Introduction, JavaScript closures, Node Modules-Common JS Modules-core modules, third-party modules, file modules, folder modules, Developing Node.js web application.	

Question paper pattern:

- There will be 2 full questions from each module.
- Each full question consists of 20 marks.
- Students have to answer 5 full questions selecting ONE from each module.

Text Books:

1. "Bootstrap Essentials",Snig Bhaumik, PACKT publishing
2. Robert W. Sebesta: Programming the World Wide Web, 7th Edition, Pearson Education,2012.
3. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw Hill, 2011
4. Amos Q. Haviv," MEAN Web Development", Packt Publishing,2014.

Reference Books:

1. Steven Holzner "Complete Reference-PHP ", Tata Mc Graw Hill,2008
2. "Bootstrap programming cook book"-Fabio Cimo,Web Code Geeks
3. Adam Bretz and Colin J. Ihrig," Full Stack JavaScript Development with MEAN", SitePoint Pty. Ltd.,2014.
4. Nicholas C Zakas et al: Professional AJAX, Wiley India, publications

Course Outcome (CO):

CO1: Design web applications using Responsive designs.
CO2: Design and develop web applications using PHP and MYSQL.
CO3: Design Single page web applications using AngularJs and Node JS.
CO4: Design asynchronous web applications using Ajax.

Information Security

SEMESTER –IV

Subject Code	18MCA441	CIE Marks	50
Number of Lecture Hours/Week	3	SEE Marks	50
Total Number of Lecture Hours	39	SEE Hours	03

CREDITS – 3:0:0

Course Learning Objectives (CLO)

- Introduce students to the area of Information Security, cybercrime and Forensics.
- To understand the motive and causes for cybercrime, detection and handling.
- To analyze the areas affected by cybercrime and investigation tools used in cyber forensic.
- To Evaluate the knowledge of report writing and Forensic ethics

Modules	
Module -1	**8 Hours**
INTRODUCTION: The Security Problem in Computing: The meaning of Information Security and computer Security, Computer Criminals, Methods of Defense, and Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption algorithms, The Data Encryption Standard, The AES Encryption Algorithms, Public Key Encryptions, and Uses of Encryption.	
Module -2	**6 Hours**
Program Security: Sphere, Terminology, Vulnerability in the Cyber Structure and Infrastructure, Cyber threats and Weaponry, Cyber Defense, Cyber Defense, Cyber Attack Detection and Prevention, Information Security Testing, Cyber Security Investigation/assessment, Cyber Deterrence.	
Module -3	**8 Hours**
Cyber Crimes and Cyber Laws: Classification of Cyber Crimes, IT laws & Cyber Crimes-Internet, Hacking, Password Cracking, Viruses, Virus Attacks, Reasons for Commission of Cyber Crimes, Malware and its type Adware, Spyware, Browser hijacking software, Virus, Worms, Trojan Horse, Scareware, Kinds of Cyber Crime.	
Module -4	**10 Hours**
Administrative Security: Security planning, Risk Analysis, Organizational Security policies, Physical Security, Legal Privacy and Ethical Issues in computer security: Protecting programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer crime, Ethical Issues in computer security.	
Module -5	**7 Hours**
Database Security: Security requirements, Reliability and integrity, Sensitivity data, proposals for multilevel security. Security in network: Threats in network, network security controls, Firewalls, Secure E-Mail.	
Question paper pattern: • The question paper will have ten questions. Choose one Question from each module • Each full question consists of 20 marks. • Questions are set covering all the topics under each module.	

Text Books:

1. SunitBelapure and Nina Godbole, " Cyber Security: Understandign Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN:978-81-265-2179-1. Publish Date 2013.

2. Surya prakash Tripathi, Rajendra Goel, and Praveen Kumar Shukla, "Introduction to Information Security and Cyber Laws", DT Editorial Services

Reference Books:

1. Thomas J. Mowbray, " Cybersecurity: Managing Systems, Conducting
Testing, and Investigating Instrusions", Copyright@2014 by John Wiley &

Sons, Inc. ISBN:978-1-118-84965-1.2014.

2. James Graham. Ryan Olson. Rick Howard. "Cyber Security Essentials", CRC
Press. 15-Dec-2010.

Course Outcome (CO): At the end of this course,   the students will be able to

CO1.Describe knowledge on the Information Security and cyber security, cybercrime and forensics.
CO2: Understand a tools and methods used in cybercrime and know about the
tools and techniques for the forensics.
CO3: Ability to apply strict policies and procedures with meticulous record
keeping.
CO4: Derive the digital forensics

ENTERPRISE APPLICATIONS LABORATORY IV SEMESTER			
Laboratory Code	18MCAL48	**CIE Marks**	50
Number of Lecture Hours/Week	02	**SEE Marks**	50
Total Number of Lecture Hours	26	**SEE Hours**	3
CREDITS – 0:0:1			

Course Learning Objective(CLO) :

- Learn the fundamental of connecting to the database
- Demonstrate server side programming using Servlet , JSP, EJB.
- Design and develop web applications using Spring and Hibernate
  Framework.

	Program Statements
1.	Write a JAVA Program to insert data into Student DATA BASE and retrieve info based on particular queries (For example update, delete, search etc…).
2.	Write a JAVA Servlet Program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a Servlet).
3.	Write a JAVA Servlet Program to Auto Web Page Refresh (Consider a webpage which is displaying Date and time or stock market status. For all such type of pages, you would need to refresh your web page regularly; Java Servlet makes this job easy by providing refresh automatically after a given interval).
4.	Write a JAVA Servlet Program to implement and demonstrate get() and Post methods(Using HTTP Servlet Class).
5.	Write a JAVA Servlet Program using cookies to remember user preferences.
6.	Write a JAVA Servlet program to track HttpSession by accepting user name and password using HTML and display the profile page on successful login.
7.	Write a JAVA JSP Program which uses jsp:include and jsp:forward action to display a Webpage.
8.	Write a JAVA JSP Program which uses <jsp:plugin> tag to run a applet
9.	Write a JAVA JSP Program to get student information through a HTML and create a JAVA Bean class, populate Bean and display the same information through another JSP
10.	Write a JSP program to implement all the attributes of page directive tag.

11.	Develop JDBC application using Spring framework
12.	Develop MVC application using Spring framework

Note 1: In the practical Examination each student has to pick one question from a lot of all the 13 questions.

Course outcomes(CO):

CO: Design and Develop real time applications using Servlets & Springs Framework.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO	PO1,PO2,PO4,PO5,PO8,PO11

SEMESTER –IV

Advanced Web Technologies Laboratory

Laboratory Code	18MCAL48	CIE Marks	50
Number of Lecture Hours/Week	02	SEE Marks	50
Total Number of Lecture Hours	26	SEE Hours	03

CREDITS – 0:0:1

Course Learning Objectives(CLO):
- To understand and analyses the role of server side scripting languages.
- To develop web applications using PHP, Ajax & Angular.
- To build responsive web application using bootstrap components and enhance with jquery effects.

Note : Student has to pick one question during examination.

PART A

1	Design a web page using Collapse, Cards and Badges.
2	Design a webpage with Home tab and Sign In links using Tabs. Apply modal for Sign In page and an image for Home tab.
3	a. Design a web page for Photo Gallery using Bootstrap Carousel b. Design a web page using Date picker and tooltips.
4	*a) Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.* b) Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
5	Design a web page using Angular Controllers and Directives.
6	Write jQuery program to solve the following : a) Limit character input in the text area including count. b) Based on check box, disable / enables the form submit button.
7	Design a single page web application using Angular & NodeJs.
8	Design an asynchronous web application using Ajax to send data to the server using GET/POST method.
9	Create XHTML form with Name of License Holder, Gender, Vehicle ID , License plate and Date of Model. On submitting, store the values in MySQL table. Retrieve and display the data based on name.
10	Develop a web page using PHP –Ajax that can communicate with a web server when user type characters in an input field (Search Suggest)

Course Outcome (CO):

CO: Design a single page web application and develop asynchronous web application using PHP, Ajax with MYSQL database.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO-1	PO4,PO5,PO11

MOBILE APPLICATIONS USING ANDROID LABORATORY

SEMESTER – IV

Course Code	18MCAL49	**CIE Marks**	50
Number of Practical Hours/Week and Number of Instructional Hours/Week	4	**SEE Marks**	50
Total Number of Lecture Hours	52	**SEE Hours**	03

CREDITS – 0:1:1

Course Learning Objectives:

- Learn the basics of mobile app development
- Build mobile applications using database
- Develop mobile app that uses GPS location information
- Students will learn to develop a mobile app project using multiple features learnt

Laboratory Programs:

The laboratory can be carried out only using any mobile application software.

Note:

1. Students are required to execute one question from Part A and give demo from Part B.

2. Part A has to be evaluated for 20 marks and Part B has to be evaluated for 30 marks along with the report.

3. The project should be carried out with a team strength of maximum two.

4. Students are expected to work for mini project apart from lab hours also with the contact of guides.

PART – A

1. Demonstrate layout

2. Demonstrate widgets

3. Demonstrate life cycle

4. Demonstrate Intents in Android, Shared preferences

5. Demonstrate Fragments in android

6. Demonstrate Animations

7. Demonstrate Email and SMS sending

8. Demonstrate Databases and content providers

    (Database using Silverlight , MySQL and firebase)

9. Demonstrate Services

10. Demonstrate Sensors and location based services

11. Demonstrate Audio playback and image capture

PART – B

Mini-Project

Students should be able to build a complete mobile app using multiple features learnt in Part – A with user interfaces and database connectivity. The Project should be deployed on the cloud like any cloud tool (ex.MS Azure, AWS etc..).

The team must submit a brief project report (25-30 pages) that must include the following

a.   Introduction

b.   Requirement Analysis

c.   Software Requirement Specification

d.   Analysis and Design

e.   Implementation

f.   Testing

4.   The report must be evaluated for 10 Marks. Demonstration and Viva for 20 Marks.

Course Outcome:

CO1: Design and develop various android mobile applications.

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO	PO1,PO2,PO4,PO5,PO8,PO11

V SEMESTER
MACHINE LEARNING USING PYTHON

Course code:	**18MCA51**	**CIE Marks:**	**50**
Number of Lecture Hours per week:	**4**	**SEE Marks:**	**50**

Total number of Lecture Hours:			52		SEE Hours:	3
Lecture (L):	4	Practical (P):		Tutorial (T):	Total Credits:	4

COURSE LEARNING OBJECTIVES (CLO)

- **To distinguish between, supervised & unsupervised and Gain knowledge about basic concepts of Machine Learning.**
- **To introduce participants to the fundamentals of data analytics using Python**
- **To apply the appropriate machine learning strategy for any given problem.**
- **To develop skills of using recent machine learning software for solving practical problems.**

MODULES	TEACHING HOURS
MODULE 1: Introduction to Machine learning	**10 Hrs**
Introduction toMachine Learning, types of Machine learning, Applications, Machine Learning Process, Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning	
MODULE 2: Python for Machine Learning	**11 Hrs**
Introduction to Pandas Data structures, Function Application & Mapping, Correlation & Covariance, Handling Missing Data, Reading & Writing Data in CSV or text files, Data Preparation-Merging and Removing data, Data Transformation-Removing Duplicates, Mapping.	
MODULE 3: Concept Learning & Unsupervised Learning	**10 Hrs**
Introduction to Bayes Theorem and Concept learning, Naive Bayes Classifier, Applications of Naïve Bayes Classifier, Clustering –Different types of the clustering techniques, K-Means Clustering	
MODULE 4: Supervised Learning	**11 Hrs**
Training a model-Linear Regression, Multiple Linear regression, Improving accuracy of Linear Regression Model, Polynomial Regression ModelClassification-Introduction, Decision Tree, Random Forest Model, Support Vector Machines, Boosting	
MODULE 5: Neural Network and Deep Learning	**10 Hrs**
Artificial Neural Networks: IntroductionArtificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm. Deep Learning-Introduction, Deep Learning Architectures	
Question Paper Pattern: • **Each full question consists of 20 marks.** • **Questions are set covering all the topics under each module**	

TextBooks	
1.	Fabio Nelli, " Python Data Analytics", Apress,Springer Science + Business Media Finance Inc (SSBM Finance Inc).
2.	Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, 1st Edition, 2019, Pearson Publications, , ISBN 978-93-530-6669-7
3.	Machine Learning, Tom M Mitchel, McGraw Hill publications,ISBN-0070428077
4.	Machine Learning with Python: Design and Develop Machine Learning and Deep Learning, BPB Publishing, India,2018

Reference Books	
1.	Jake Vander plas, "Python Data Science Handbook: Essential tools for working with data", O'Reilly Publishers, I Edition.
2.	EthemAlpaydin "Introduction To Machine Learning" 2nd Edition PHI Learning Pvt. Ltd-New Delhi.

COURSE OUTCOMES (CO)

CO1: Understand the concepts related to Machine Learning techniques.

CO2: Demonstrate Pre-processing techniques and perform exploratory data analysis related to a scenario.

CO3:Identify and apply the appropriate techniques to process the data and solve the applications using machine learning techniques

CO4: Apply data analytics principles and techniques of Machine learning to solve real time problems

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO2,
CO2	PO1,PO2,PO4,PO8
CO3	PO1,PO2,PO4,PO5,PO8,PO10,PO11
CO4	PO1,PO2,PO4,PO5,PO8,PO10,PO11

V SEMESTER BIG DATA ANALYTICS			
Course code:	18MCA52	**CIE Marks:**	50
Number of Lecture Hours per week:	3	**SEE Marks:**	50
Total number of Lecture Hours:	39	**SEE Hours:**	3
Lecture (L): 3	**Practical (P):**	**Tutorial (T):**	**Total Credits:** 3

MODULES	TEACHING HOURS

COURSE LEARNING OBJECTIVES (CLO)

- **To impart fundamental concepts about big data and its identification.**
- **To analyse the design of Hadoop Distributed Files system.**
- **To understand and analyse Map Reduce technique for solving Big Data problems**
- **To analyse different hadoop related tools like Pig & Hive**

MODULES	TEACHING HOURS
MODULE 1: Big Data & Hadoop Eco system	**8 Hrs**
Example Applications, Basic Nomenclature, Analysis Process Model, Analytical Model Requirements , types of Data Sources, Sampling, Types of data elements, data explorations, exploratory statistical analysis, missing values, outlier detection and Treatment, cloud and Big Data –Predictive Analytics. A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem Hadoop Releases Response.	
MODULE 2: The Hadoop Distributed File system	**8 Hrs**
The Hadoop Distributed File system The Design of HDFS, HDFS Concepts, Blocks, Name nodes and Datanodes, HDFS Federation, HDFS High-Availability, The Command Line Interface, Basic File system Operations, Hadoop File systems Interfaces ,The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the File System API, Writing Data, Directories, Querying the File system, Deleting Data, Data Flow Anatomy of a File Read ,Anatomy of a File Write	
MODULE 3: Map Reduce	**8 Hrs**
A Weather Dataset ,Data Format, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Map and Reduce, Working of Map Reduce - Anatomy of a Map Reduce Job Run, Failures, Shuffle and Sort, Task Execution, Map Reduce Formats - Input Formats, Output Formats	
MODULE 4: Hadoop Tool-Pig	**8 Hrs**
Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts, **Pig Latin** – Structure, Statements, Expressions, Types, Schemas, Functions, Macros,User-Defined Functions – A Filter UDF, An Eval UDF, A Load UDF.DataProcessing Operators – Loading and storing of data, Filtering data, Groupingand Joining data, Sorting data	
MODULE 5: Hadoop Tool-Hive	**7 Hrs**
Installing Hive – The Hive shell,Hive – Architecture, data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries. Tables – Managed Tables and External Tables, Partitions and Buckets, Importing Data,Querying Data – Sorting and Aggregating,Storage Formats, Joins, Sub queries, Views.	

Question Paper Pattern:
- **Each full question consists of 20 marks.**

- **Questions are set covering all the topics under each module**

TextBooks

1. Bart Baesens, " Analytics in a Big Data World : The Essential Guide to Data Science and its Applications" Wiley
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly, 2012.
3. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
4. Alan Gates, "Programming Pig", O'Reilley, 2011

Reference Books

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.

COURSE OUTCOMES (CO)

CO1: Explain the fundamentals of big data analytical techniques and usage of hadoop tools.

CO2: Analyse Hadoop ecosystem and Map Reduce concept to solve big data problems.

CO3: Design a Map-Reduce model to process the datausing tools for a use case.

CO4: Evaluate the performance of data analytics and visualize the results.

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO4
CO2	PO2,PO4,PO5
CO3	PO2,PO3,PO4,PO5,PO7,PO11
CO4	PO2,PO3,PO4,PO5,PO7,PO11

V SEMESTER CLOUD COMPUTING					
Course code:		**18MCA53**		**CIE Marks:**	**50**
Number of Lecture Hours per week:		**03**		**SEE Marks:**	**50**
Total number of Lecture Hours:		**39**		**SEE Hours:**	**3**
Lecture (L):	**3**	**Practical (P):**	**0**	**Tutorial (T):**	**0**	**Total Credits:**	**3**

COURSE LEARNING OBJECTIVES (CLO)

- **Introduce the fundamental aspects of cloud computing**

- **Discuss virtualization technologies along with the architectural models of cloud computing.**

- **Leverage the prominent Cloud computing technologies available in the market place.**

- **Demonstrate different features of cloud platforms used in Industry**

- **To understand how energy efficiency achieved in cloud computing using green computing and understand the mechanism needed to harness cloud computing in the respective endeavours**

MODULES	TEACHING HOURS
MODULE-1: CLOUD COMPUTING OVERVIEW	**07 Hours**
Cloud Computing Overview, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Architecture, Characteristics and Benefits, Challenges in the cloud, Historical Developments, Distributed Systems, Virtualization, Web 20, Service Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Forcecom and Salesforcecom,	
Module-2: Virtualization	**8 Hours**
Virtualization Introduction, Characteristics of virtualized environments, Increased security, Managed execution, Portability, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples- Xen par virtualization, VMware: full virtualization, Microsoft Hyper-V. Cloud Computing Architecture: Introduction, Reference model- Architecture, Infrastructure- and hardware-as-a-service, Platform as a service, Software asa service, Deployment Model- Public clouds, Private clouds, Hybrid clouds, Community clouds, Open challenges.	
Module-3:CloudManagement	**9 Hours**
Service Level Agreement, Cloud Economics, Managing Data, Introduction to Map Reduce, Open Stack, Resource Management.	
Module-4: Cloud Platforms in Industry	**08 Hours**

Amazon web services: Compute services, Storage services, Communication services, Additional services. Google Cloud, AppEngine: Architecture and core concepts, Application life cycle, Cost model Observations Microsoft Azure: Azure core concepts, SQL Azure, Windows Azure platform appliance, Observations	
Module-5: Advanced Topics in Cloud Computing	**08Hours**
Green cloud computing , Introduction to Docker Container, Sensor Cloud Computing, IoT Cloud, Fog Computing, Mobile Cloud Computing	

Question Paper Pattern:
- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

Textbooks:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley,2011

2. Enterprise Cloud Computing - Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010

3. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Reference Books

1. Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds. Cloud computing: Principles and paradigms. Vol. 87. John Wiley & Sons, 2010.

COURSE OUTCOMES (CO)

CO1: Explain the fundamental principles of cloud computing and its related Concepts.

CO2: Analyze Prominent Cloud computing technologies available in the marketplace.

CO3: Apply suitable applications to leverage the strength of cloud computing.

CO4: Develop the applications of cloud Computing that can harness the power of cloud computing.

CO5: Explain the fundamental principles of cloud computing and its related Concepts.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	**PO1,PO2,PO3,PO4**
CO2	**PO1,PO2,PO3,PO4, PO6**
CO3	**PO1,PO2,PO3,PO4,PO6**

CO4	PO1,PO2,PO3,PO4
CO1	PO1,PO2,PO3,PO4

V SEMESTER **MACHINE LEARNING USING PYTHON LAB**						
Course code:			**18MCAL56**		**CIE Marks:**	
Number of Lecture Hours per week:			**2**		**SEE Marks:**	
Total number of Lecture Hours:			**26**		**SEE Hours:**	
Lectu re (L):		**Practic al (P):**		**Tutori al (T):**	**0**	**Total Credits:**	

		COURSE LEARNING OBJECTIVES (CLO)

- To understand Pre-processing techniques and perform exploratory data analysis .

- Identify and apply Machine Learning algorithms to solve real world problems

- To develop skills of using recent machine learning software for solving practical problems

		Program
1.		Create a Data frame and demonstrate different ways to treat missing values.
2.		Implement Data Wrangling (Merge, Concatenate, Group) and Data Aggregation.
3.	a. b.	Write a python program to read and write data into files (.CSV, .txt, .XLS). Perform exploratory data analysis (Head, Tail, Description, etc.) on any dataset.

4.	Implement Linear Regression using Python Script and identify explanatory variables.
5.	Write a program to demonstrate the working of the decision tree.
6.	Implement clustering technique for a given data set in python.
7.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored asa .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8.	Build an Artificial Neural Network by implementing the Back propagation algorithm and test thesame using appropriate data sets.

Note : Student has to pick one question from a lot of 8 questions

COURSE OUTCOMES (CO)

CO1: Implement exploratory data analysis, data visualization and different machine Learning Techniques to solve real world problems in Python.

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	**PO2, PO4, PO5, PO7,PO11**

V SEMESTER
BIG DATA ANALYTICS LAB

Course code:		18MCAL57		CIE Marks:	
Number of Lecture Hours per week:		2		SEE Marks:	
Total number of Lecture Hours:		26		SEE Hours:	
Lectu re (L):		Practi cal (P):		Tutori al (T):	0	Total Credits:	

COURSE LEARNING OBJECTIVES (CLO)

- To set up single and multi-node Hadoop Clusters.

- To solve Big Data problems using Map Reduce Technique.

- To design algorithms that uses Map Reduce Technique to apply on Unstructured and structured data.

	• To implement programming tools PIG and HIVE in Hadoop eco system.	
	Program	
1.	Hadoop Installation.	
2.	Installation of VMWare to setup the Hadoop environment and its ecosystems.	
3.	a. Implement the following file management tasks in Hadoop: i. Adding files and directories ii. Retrieving files iii. Deleting files	
4.	Run a basic word count Map Reduce program to understand Map Reduce Paradigm.	
5.	Write a Map Reduce program that mines weather data.	
6.	Implement matrix multiplication with Hadoop Map Reduce.	
7.	Installation of PIG. Write Pig Latin scripts sort, group, join, project, and filter your data.	
8.	a. Run the Pig Latin Scripts to find Word Count b. Run the Pig Latin Scripts to find a max temp for each and every year.	
9.	Installation of HIVE. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.	

Note : Student has to pick one question from a lot of 9 questions

COURSE OUTCOMES (CO)

<mark>CO1:   Apply Hadoop, MapReduce, HDFS and YARN develop big data applications and Explore the working of Pig & Hive and analyse the results.</mark>

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	**PO3,PO4,PO5,PO7,PO11**

V SEMESTER **CLOUD COMPUTING LAB**				
Course code:	**18MCAL58**	**CIE Marks:**	
Number of Lecture Hours per week:	**2**	**SEE Marks:**	

Total number of Lecture Hours:		26		SEE Hours:	
Lecture (L):		Practicals (P):		Tutorial (T):	0	Total Credits:	

COURSE LEARNING OBJECTIVES (CLO)

- To work with Virtualization.

- Explore different Cloud services: Amazon, Google apps and Salesforce and VMware

- Design Virtual Machine using VM player and test Client server application using Virtual Machine.

- Demonstrating IaaS, PaaS and SaaS.

Sl. No	Program
10.	• **Working with Amazon Web Services(AWS)** • Familiarize the services by AWS • Creating user login • Creating Linux, Windows virtual machines instance using EC2 • Run simple applications on EC2 Instance • Creating Storage using S3 • Create a Backup using Image and launch new instance using Backup image • Creating an RDS Instance with MySQL Workbench and Dynamo DB • Demonstrate Database application on AWS • Upgrading and downgrading the infrastructure based on the requirement • Demonstrate Load balancing using different instance of EC2 • Launch a web application. • Demonstration of Identity and Access management. • Demonstrate Elastic bean stack • Demonstrate AWS dynamic web application
11.	**SalesforceTrailhead Platform** • Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database on Salesforce cloud platform. • Create a web application to implement an online cart for adding items to a shopping cart and deleting it. • Create a web application to enter the faculty details like faculty ID, faculty name, and salary to a database and calculate the income tax to be paid by the faculty at the end of financial year. • Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.

- Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.
- Develop Department events' registration app with an object containing event name, date/time, venue as parent relationship, another object containing student name, branch, event name, date/time, and venue as child relationship.
- Develop Blood donation registration app with an object which records donors' name , age and blood group as parent relationship and another object containing hemoglobin level, donated or not details (if age>18) child relationship.
- Develop Attendance maintenance app with an object to record student details, attendance and provide a link to college websites' results webpage.
- Create a web application with objects to maintain database of an art gallery which contains objects like artists, arts, and inventory and provide a link to any of the art gallery website.

Course Outcome(CO)

CO1: Demonstrate Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

COURSE OUTCOMES	MAPPING WITH PROGRAM OUTCOMES:
CO 1	PO1,PO2,PO3

V SEMESTER

ENTERPRISE APPLICATION-2

Course code:		18MCA541		CIE Marks:	50
Number of Lecture Hours per week:		3		SEE Marks:	50
Total number of Lecture Hours:		39		SEE Hours:	3 Hrs
Lecture (L):	3	Practicals (P):	0	Tutorial (T):	0	Total Credits:	3

COURSE LEARNING OBJECTIVES (CLO)

- **To describe the Fundamentals of .Net framework**
- **To demonstrate Object Oriented Programming concepts using C#**
- **To implement delegates, event handling and exception handling**
- **To develop Web applications using ASP.NET,ADO.NET**

MODULES	TEACHINGHOURS

MODULE 1: 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: CLR, CTS, Metadata and Assemblies, .NET Framework Class Library, Windows Forms, ASP .NET and ASP .NET AJAX, ADO .NET, Windows workflow Foundation, Windows Presentation Foundation, Windows Communication Foundation, Widows Card Space and LINQ. **Introducing C#** Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing andUnBoxing , Variables and Constants . Expression and Operators : Operator Precedence, Using the ?? (Null Coalescing) Operator, Using the :: (Scope Resolution) Operator and Using the is and as Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements	**7 Hrs**
MODULE 2: Namespaces,Classes and Object Oriented Programming Namespaces, The System namespace, Classes and Objects: Creating a Class, Creating an Object, Using this Keyword, 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 Class Members. Properties: Read-only Property, Static Property, Accessibility of assessors and Anonymous types. Indexers, Structs: Syntax of a struct and Access Modifiers for structs.System.Object Class **Encapsulation:** Encapsulation using assessors 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	**8 Hrs**
MODULE 3: Delegates, Events, Exception Handling **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	**8 Hrs**
MODULE 4: Graphical User Interface with 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.	**8 Hrs**
MODULE 5: Web App Development and Data Access using ADO.NET Introduction to Web Basics, Multitier Application Architecture, First Web Application: Building Web-Time Application, Examining Web-Time.aspx's Code-	**8 Hrs**

Behind File, Understanding Master pages, Standard Web Controls: Designing a Form, Validation Controls, GridView Control, DropDownList, Session Tracking.Set up the sample database,Create the forms and add controls,Store the connection string,Retrieve the connection string,Write the code for the forms,Test your application

ASP.NET AJAX : Exploring AJAX,Need for AJAX, AJAX and other Technologies, AJAX Server Controls, ScriptManager control, Update Panel, UpdateProgress Control, Creating Simple Application using AJAX Server Controls.

Question Paper Pattern:

- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

TextBooks:

1. .NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiley- Dream Tech Press.
2. Paul Deitel and Harvey Deitel: C# 2010 for Programmers, 4th Edition, Pearson Education.

Reference Books

1. Andrew Trolsen: Pro C# 5.0 and the .NET 4.5 Framework, 6th Edition, WileyAppress.
2. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.
3. Herbert Schildt: Complete Reference C# 4.0, Tata McGraw Hill, 2010.

COURSE OUTCOMES (CO)

CO1: Distinguish the features of C# and client-server concepts using .Net Framework   Components.

CO2: Demonstrate delegates, events and exception handling with

ASP, Win Form, ADO.NET.

CO3: Develop Graphical User Interface for various applications

CO4: Develop Web based and Console based applications with database connectivity

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO1,PO2,PO3,PO4,PO5,PO8
CO2	PO1,PO2,PO3,PO4
CO3	PO1,PO2,PO3,PO4,PO5
CO4	PO1,PO2,PO3,PO4,PO5

<table>
<tr><td colspan="7" align="center">V SEMESTER

FULL STACK DEVELOPMENT WITH MERN</td></tr>
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Course Code:				**18MCA542**	**CIE Marks:**	**50**
Number of Lecture Hours per week:				**3**	**SEE Marks:**	**50**
Total number of Lecture Hours:				**39**	**SEE Hours:**	**3**
Lecture (L):	**3**	**Practicals (P):**	**0**	**Tutorial (T):** 0	**Total Credits:**	**3**

COURSE LEARNING OBJECTIVES (CLO)

- **To design as web page using front end technologies**

- **To develop application with server side scripting tools**

- **To develop web application with REST APIs and use of framework to communicate client-server applications.**

- **To build as responsive web application with managing NOSQL databases.**

MODULES	**TEACHING HOURS**
MODULE 1: Introduction to React	**10 Hrs**
Welcome to React: Obstacles and Roadblocks, React's future, keeping up with the changes, working with the files.	

The Basics-Introduction, Installation, getting started hello world program, Lifecycle of Components, Understanding Functional & Class Components Passing Data.	
MODULE 2: React Components and Redux	**11 Hrs**
React Props, React state-setting state, Event handling, Designing components-state vs props An Introduction to Redux- Core Concepts, Reducer, Action, Action Creator, Combining Reducers, Store, Data Flow in Redux, Usage with React	
MODULE 3: Programming in Node.js	**11 Hrs**
Node.js Installation –getting started, Control flow, asynchronous pattern callback, Sequential functionality, nested callbacks and exception handling, asynchronous patterns and control flow. Routing Traffic, Serving Files and Middleware: Building a Simple Static File Server from Scratch, Middleware, Routers and Proxies	
MODULE 4: Expressing REST APIs	**10 Hrs**
REST-HTTP Methods as actions, Express-Routing, Handler Functions, The List API-automatic Server Restart, testing, Create API, Error Handling.	
MODULE 5: Module Title	**10 Hrs**
Introduction to MongoDB: -Installation-Databases, Data Types, Using MongoDB Shell. Creating, Updating, Deleting and Querying Documents: Inserting, removing, and updating the documents. Scheme Initialization, Reading and writing to Mongodb.	

Question Paper Pattern:

- **Each full question consists of 20 marks.**
- **Questions are set covering all the topics under each module**

Text Books

1. Tomasz Dyl Kamil Przeorski, "Mastering Full-Stack React Web Development", 2017 Packt Publishing

2. Vasan Subramanian ,"ProMERN Stack",Apress,2018.

Reference Books

1. Eddy Wilson IriarteKoroliova ,"MERN-Full stack Development", Packt Publishing Ltd.,2018
2. ShamaHoque,"Full stack React Projects",Pack Publishing Ltd.,2018.

COURSE OUTCOMES (CO)

CO1: Demonstrate basic concepts of react, node, express and mongodbtechologies

CO2: Design front end application using React and Redux libraries.	
CO3: Develop interactive web applications on server side with NOSQL databases.	
CO4: Build responsive web application communicating with RES API and managing data with NOSQL databases.	
Course Outcomes(Cos)	**Mapping with Program Outcomes(POs)**
CO1	**PO5,PO11**
CO2	**PO2,PO4,PO5,PO11**
CO3	**PO2,PO4,PO5,PO7,PO11**
CO4	**PO5,PO11**

V SEMESTER					
INTERNET OF THINGS					
Course code:			**18MCA552**	**CIE Marks:**	**50**
Number of Lecture Hours per week:			**03**	**SEE Marks:**	**50**
Total number of Lecture Hours:			**39**	**SEE Hours:**	**3 Hrs**
Lecture (L):	**3**	**Practicals (P):**	**0**	**Tutorial (T):**	**0**	**Total Credits:**	**3**

COURSE LEARNING OBJECTIVES (CLO)	
• **Learn the evolution of IOT from M2M to global Context**	
• **Understand IoT in managing data and knowledge**	
• **Analyze the architecture of IoT and assess its industrial applications**	

MODULES	TEACHING HOURS
MODULE 1: Understanding M2M and IoT Introduction: The Vision- From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics	**8 Hrs**
MODULE 2: Introduction to IoT Architecture **A Market Perspective** – Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An example for an Industrial Structure **M2M to IoT - An Architectural Overview: B**uilding an architecture, Main design principles and needed capabilities, An IoT architecture outline	**8 Hrs**
MODULE 3: Understanding XaaS Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Knowledge Management	**8 Hrs**
MODULE 4: IoT Reference Architecture Reference Architecture: ITU-T, Reference Models: IoT Domain Model, Information Model, Functional Model, Communication model, Safety, Privacy, Trust, Security Model	**8 Hrs**
MODULE 5: IoT Real time Applications Asset Management, Hazardous Goods Management, Other real time applications	**7 Hrs**

Question Paper Pattern:
• **Each full question consists of 20 marks.**   • **Questions are set covering all the topics under each module**

TextBooks
1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",1st Edition,AcademicPress, 2014.

Reference Books
1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

COURSE OUTCOMES (CO)

CO1: Study the evolution of IoT towards global context

CO2: Understand the architecture of IoT and the underlying technology

CO3: Analyze the implications of IoT with real time applications

CO4: Apply the state of the art architecture of IoT to be deployed in real time world

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO3, PO5
CO2	PO3, PO5, PO8, PO10
CO3	PO3, PO6, PO8
CO4	PO5, PO6, PO10, PO12

V SEMESTER				
BLOCKCHAIN TECHNOLOGY				
Course code:		**18MCA553**	**CIE Marks:**	**50**
Number of Lecture Hours per week:		**03**	**SEE Marks:**	**50**
Total number of Lecture Hours:		**39**	**SEE Hours:**	**3 Hrs**
Lecture (L): 3	**Practicals (P):** 0	**Tutorial (T):** 0	**Total Credits:**	**3**

COURSE LEARNING OBJECTIVES (CLO)

- **Designed to provide the conceptual understanding of the blockchain**
- **Learn the working technology of blockchain**
- **Understand the application scenarios of blockchain**
- **Implement blockchain in Ethereum technology**

MODULES	TEACHING HOURS
MODULE 1: Basis of Blockchain Technology Introduction to Blockchain, growth – Definition – Elements of Blockchain, Tiers, Types, Consensus, Decentralization: Methods of Decentralization, Routes to decentralization, Blockchain and full ecosystem decentralization	**8 Hrs**
MODULE 2: Blockchain Mining Blockchain: The structure of block, The structure of block header, genesis block – Mining: Tasks, Rewards, Proof of Work, Mining Algorithm, Mining Systems: CPU, GPU, FGPA, ASIC- Mining Pools	**8 Hrs**
MODULE 3: Use case - Financial Markets and Smart Contracts Trading, Exchanges, Trade Lifecycle, order anticipators, Market, Manipulation, Smart Contracts: Templates, Smart Oracles, Deploying smart contracts in Blockchain	**8 Hrs**
MODULE 4: Generic Use Cases BlockChain as Evidences – Digital Art - BlockChain Health –Blockchain Government	**8 Hrs**
MODULE 5: Technology on Ethereum Ethereum blockchain, Ethereum network: mainnet, testnet, private net, components of Ethereum ecosystem, Ethereum Virtual Machine	**7 Hrs**
Question Paper Pattern: - **Each full question consists of 20 marks.** - **Questions are set covering all the topics under each module**	

TextBooks
1. Mastering Blockchain, by Imran Bashir, II edition Packt Publications
2. BlockChain: Blueprint for a new economy, by Melanie Swan O'Reilly Publications
Reference Books
1. "BlockChain: A Beginners Guide", Authors: SherminVoshmgir, Valentin Kalinov Publisher: https://blockchainhub.net/
2. "Cryptocurrency and Bitcoin Technologies", Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder published by Princeton University press 2016
COURSE OUTCOMES (CO)
CO1: Understand the structure and underlying technology of blockchain
CO2: Analyze the application scenarios of blockchain
CO3: Apply the blockchain technology to build a blockchain system

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(CO)	Mapping with Program Outcomes(PO)
CO1	PO1,PO3
CO2	PO3, PO7, PO10
CO3	PO3, PO4, PO5, PO7, PO10

V SEMESTER

INDUSTRY INTERNSHIP

Course code:				18MCAI59	CIE Marks:		50
Number of Lecture Hours per week:				-	SEE Marks:		50
Total number of Lecture Hours:				-	SEE Hours:		3
Lecture (L):	0	Practicals (P):	0	Tutorial (T):	0	Total Credits:	05

Internship - Guidelines

 - The students should undergo an internship for 4 weeks during the vacation soon after the 3rd semester SEE.
 - The internship shall be carried out in an Industry/R&D labs or at Institution.
 - The student should submit the internship report and make the presentation to the internal panel.
 - The internal panel will evaluate the internship work for 50 Marks.
 - SEE will be conducted for Internship and will be evaluated for 50 Marks

Course Outcomes	
CO1	Apply domain knowledge in proposing solution for IT problem
CO2	Develop/implement the design with appropriate techniques and tools to deliver the solution.
CO3	Work in independently or in collaborative environment
CO4	Develop communications skills, make presentations and prepare technical document

VI SEMESTER					
PROJECT WORK					
Course code:		**18MCAP62**	**CIE Marks:**		**50**
Number of Lecture Hours per week:		-	**SEE Marks:**		**200**
Total number of Lecture Hours:		-	**SEE Hours:**		**3**
Lecture (L):	**0**	**Practicals (P):** **0**	**Tutorial (T):** **0**	**Total Credits:**	**20**

Synopsis

➢ The Synopsis of the project must be submitted before the third week of 4th semester.

➢ The synopsis of the project must include:

a) Problem formulation and literature survey.

b) Details of the required tools and technologies for the development of project.

c) Write up shall not exceed 15 pages.

➢ Internal assessment for synopsis presentation and evaluation of the synopsis by the internal panel /guide is for 100 marks.

Dissertation:

➢ The project shall be carried out in the same institution or in industry/R&D labs, based on software tools and technologies learnt in MCA course/internship for minimum period of 16 weeks.

➢ Internal assessment shall be evaluated by the internal panel/guide for **50** marks. For continuous evaluation of project work by the internal examiner/guide with progress reports is for 10 marks each. (3 progress reports x 10 marks= 30)

➢ Final presentation for the entire project is evaluated for 20 marks by the project Guide.

- The internal examiners (Project Guide with at least 3 years of experience) and the external examiners shall be appointed by the authorities of the college for the final evaluation of the project.
- Internal and external examiners shall carry out the evaluation of Dissertation report for **100** marks individually. The average of the marks allotted by the internal and external examiners shall be the final marks for the project Dissertation report evaluation.
- The project presentation and Viva-voce examination shall be evaluated jointly by both the internal and external examiners for **100** marks.
- The student shall publish the project outcome in the reputed journals.

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES:

Course Outcomes(COs)	Mapping with Program Outcomes(POs)
CO1	PO1,PO2,PO3,PO4
CO2	PO1,PO2,PO3,PO4,PO5,PO7,PO8
CO3	PO4,PO5,PO7,PO8,PO10,PO11
CO4	PO4,PO5,PO7,PO8,PO9,PO10,PO11,PO12