Semester-wise structure for
Two Year
M.C.A. Program

(SEMESTER III AND SEMESTER IV)

As per NEP 2020 for Affiliated Colleges
w.e.f. – June 2025

Abbreviations:

- **T:** Theory Course
- **P:** Practical course
- **DSC:** Discipline Specific Core Course
- **DSE:** Discipline Specific ElectiveCourse
- **OJT:** On Job Training: Internship/Apprenticeship
- **RP:** Research Project
- **RM:** Research methodology
- **MOOC:** Massive Open Online Course

Master of Computer Application program is a two-year program as per National Education Policy 2020 with effect from academic year 2024-25. Curriculum designed for MCA includes fundamentals and recent technologies required in IT industries.

Program Educational Objectives (PEO)	
PEO 1	**Advanced Knowledge and Technical Skills** Provide a strong foundation in programming, data structures, and algorithms, enabling students to excel in the IT industry
PEO 2	**Practical and Research Skills** Develop the ability to apply theoretical knowledge to practical problems through hands-on projects and research, fostering innovation and problem-solving skills.
PEO 3	**Professional and Ethical Practices** Instill professional ethics, effective communication, and leadership skills to prepare graduates for successful careers and leadership roles.
PEO 4	**Lifelong Learning and Adaptability** Encourage continuous learning and adaptability to evolving technologies and methodologies in the dynamic field of computer applications

Program Outcomes (PO)	
PO 1	**Technical Proficiency** Gain a thorough understanding of computer science principles, programming languages, software engineering, and technology tools.
PO 2	**Problem Solving and Analytical Skills** Analyze complex problems, design solutions using appropriate methodologies, and evaluate their effectiveness.
PO 3	**Research and Development** Conduct research contribute to technological advancements and apply innovative solutions to practical problems.
PO 4	**Project Management and Development** Manage and lead projects, including planning, execution, and delivery within specified constraints.
PO 5	**Ethical and Professional Practices** Demonstrate professionalism, ethical behavior, and the ability to work collaboratively in diverse environments.
PO 6	**Lifelong Learning** Engage in continuous learning and adapt to new technologies and industry trends.

Program Specific Outcomes (PSO)		**Cognitive Level**
PSO 1	**Software Development** Design, develop, and maintain software applications using advanced programming languages, frameworks, and tools.	BT Level 2 ,3,6
PSO 2	**Data Management and Analysis** Manage and analyze large datasets using modern database systems, data science techniques, and big data technologies.	BT Level 2 ,3,4
PSO 3	**Cyber security and Information Security** Understand cyber security principles and practices, protecting information systems from various threats and vulnerabilities	BT Level 2 ,3,5
PSO 4	**Emerging Technologies** Work with emerging technologies such as artificial intelligence, machine learning, block chain, and cloud computing	BT Level 2 ,3,6

Semester-wise Code structure for M.C.A. Program as per NEP 2020, for Affiliated Colleges w.e.f – June 2024.											
MCA– Second Year, SEMESTER – III, Level – 6.0											
Course	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Teaching Hours/ Week**			**Marks**			
					T	**P**	**Total**	**Internal (CA)**		**External (UA)**	
								T	**P**	**T**	**P**
DSC-12	DSC	MCA-511	Deep Learning	4	4	-	4	40	-	60	-
DSC-13	DSC	MCA-512	Block Chain Technologies	4	4	-	4	40	-	60	-
Elective DSE –VII (A) DSE-VIII (B) Choose any one group	Group1	MCA-513(A)	Mobile Application Development	2	2	-	2	20	-	30	-
		MCA-513(B)	Lab on Mobile Application Development	2	-	4	4	-	20	-	30
	Group2	MCA-514(A)	Business Intelligence	2	2	-	2	20	-	30	-
		MCA-514(B)	Lab on Business Intelligence	2	-	4	4	-	20	-	30
	Group3	MCA-515(A)	Generative AI	2	2	-	2	20	-	30	-
		MCA-515(B)	Lab on Generative AI	2	-	4	4	-	20	-	30
	Group4	MCA-516(A)	UI and UX design	2	2	-	2	20	-	30	-
		MCA-516(B)	Lab on UI and UX design	2	-	4	4	-	20	-	30
Elective DSE –IX (A) DSE-X (B) Choose any one group	Group1	MCA-517(A)	Dev Ops	2	2	-	2	20	-	30	-
		MCA-517(B)	Lab on Dev Ops	2	-	4	4	-	20	-	30
	Group2	MCA-518(A)	E-Commerce Technologies and Management	2	2	-	2	20	-	30	-
		MCA-518(B)	Lab on E Commerce Technologies and Management	2	-	4	4	-	20	-	30
	Group3	MCA-519(A)	Social Media Analytics	2	2	-	2	20	-	30	-
		MCA-519(B)	Lab on Social Media Analytics	2	-	4	4	-	20	-	30
	Group4	MCA-520(A)	Virtual and Augmented Reality	2	2	-	2	20	-	30	-
		MCA-520(B)	Lab on Virtual and Augmented Reality	2	-	4	4	-	20	-	30
RP	RP	MCA-521	Research Project	6	-	12	12	-	40	-	60
Credits for Semester III : 52+22=74											

Semester-wise Code structure for M.C.A. Program as per NEP 2020, for Affiliated Colleges w.e.f – June 2024.											
MCA– Second Year, SEMESTER – IV, Level – 6.0											
Course	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Teaching Hours/ Week**			**Marks**			
					T	**P**	**Total**	**Internal (CA)**		**External (UA)**	
								T	**P**	**T**	**P**
MOOC-1	MOOC	MCA-531	Massive Open Online Course-1 (NPTEL, Swayam)	4	4	-	4	-	-	100	-
MOOC-2	MOOC	MCA-532	Massive Open Online Course-2 (NPTEL, Swayam)	4	4	-	4	-	-	100	-
OJT-1	OJT	MCA-533	On Job Training (Internship)	12	-	-	360	-	-	-	300
Cumulative Credits for Second Year: 74+ 20 = 94											

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-511: Deep Learning
W.E.F.2024-25
[Total Marks : External 60 + Internal 40 = 100 Marks]

Semester	III	CIE Marks:	40
Course Code	**MCA-511**	SEE Marks:	60
Contact Hours(L.T.P)	4:0:0	Exam Hours:	03

Course Objectives:

1. Recall and recognize fundamental concepts in deep learning
2. Discuss Deep learning techniques and their applications.
3. To understand CNN and RNN algorithms and their applications.
4. To understand the knowledge on Back propagation through time

Unit-1: INTRODUCTION TO DEEP LEARNING [Lecture-10][Marks-20]

History of Deep Learning, Definition and importance of Deep Learning, Historical overview and milestones in Deep Learning, Deep Learning in current scenario, Comparison with Deep Learning vs machine learning, Basic concepts: neural networks, activation functions, layers, Linear regression, etc., Applications of Deep Learning in various domains, Overfitting and Underfitting problem, Hyperparameter and model validation, Estimators, Bias and Variance.

Unit-2: INTRODUCTION TO NEURAL NETWORKS AND OPTIMIZATION [Lecture-12][Marks-20]

Perceptrons and the McCulloch-Pitts model, Feedforward neural networks: architecture, forward propagation, backpropagation, Activation functions: sigmoid, tanh, ReLU, etc.,Loss functions and optimization techniques: gradient descent, stochastic gradient descent,etc., Regularization techniques: dropout, L2 regularization, etc.

Unit-3: CONVOLUTIONAL NEURAL NETWORKS (CNNs) [Lecture-14][Marks-20]

Introduction to CNNs and their applications in computer vision, Convolutional layers: filters, feature maps, receptive fields, Pooling layers: max pooling, average pooling, CNN architectures: LeNet, AlexNet, VGG, ResNet, etc., Transfer learning and fine-tuning pretrained CNNs, data transformation using PCA.

Unit-4: RECURRENT NEURAL NETWORKS (RNNs) [Lecture-12][Marks-20]

Introduction to RNNs and their applications in sequential data analysis, Basic RNN architecture: recurrent connections, hidden states, time-series data, Long Short-Term Memory (LSTM) networks and Gated Recurrent Units (GRUs), Applications of RNNs: natural language processing, time series prediction, etc., Challenges and limitations of RNNs

Unit-5: ADVANCED TOPICS IN DEEP LEARNING [Lecture-12][Marks-20]

Generative Adversarial Networks (GANs) and their applications in generative modeling, Auto encoders and dimensionality reduction techniques, Attention mechanisms in Deep Learning, Reinforcement Learning and its integration with Deep Learning, Future trends and emerging technologies in Deep Learning.

Reference Books:

- "Deep Learning for Computer Vision" by Rajalingappaa Shanmugamani
- "Neural Networks and Deep Learning: A Textbook" by Charu C. Aggarwal
- "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville

- Good fellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.
- Josh Patterson, Adam Gibson, Deep Learning: A Practitioner's Approach, OReilly, 2017.

Course Outcomes : At the end of the course, students will be able to	**Cognitive level**
CO1: Understand and describe key concepts, evolution, importance, and applications of deep learning.	Understand (2)
CO2: Apply basic neural network architectures and optimization techniques.	Apply (3)
CO3: Design and implement CNNs for computer vision tasks and transfer learning.	Apply (3)
CO4: Apply RNNs, LSTMs, and GRUs for sequential data problems.	Apply (3)
CO5: Analyze and evaluate advanced deep learning techniques like GANs and RL.	Analyze (4)/ Evaluate(5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-512: Block Chain Technology
W.E.F.2025-26
[Total Marks : External 60 + Internal 40 = 100 Marks]

Semester	III	CA Marks:	40
Course Code	**MCA-512**	UA Marks:	60
Contact Hours(L.T.P)	4:0:0	Exam Hours:	03

Course Objectives: By the end of the course, students will be able to
1. Understand how blockchain systems (mainly Bitcoin and Ethereum) work,
2. To securely interact with them,
3. Design, build, and deploy smart contracts and distributed applications,
4. Integrate ideas from blockchain technology into their own projects.

Unit-1: INTRODUCTION TO BLOCK CHAIN [Lecture-15] [Marks-25]

Introduction to Blockchain and its Origin, Applications of Blockchain, Digital trust, Asset, Transactions,Distributed Ledger Technology, Types of network, Components of blockchain or DLT, **Ledger** : Blocks, Blockchain ; PKI and Cryptography :Private keys, Public keys, Hashing , Digital Signature; **Consensus** : Byzantine Fault, Proof of Work, Poof of Stake; **Security :** DDos; Cryptocurrency,Peer to peer networks (structured and unstructured),Digital Token

Unit-2: HOW BLOCKCHAIN OPERATES [Lecture-15] [Marks-25]

How blockchain work,Structure of Blockchain, Block, Hash, Blockchain,Distributed ,Lifecycle of Blockchain,Smart Contract, Consensus Algorithm, Proof of Work, Proof of Stake,Practical Byzantine, Fault Tolerance,Actors of Blockchain ,Blockchain developer,Blockchain operator, Blockchain regulator,Blockchain user,Membership service provider, Building A Small Blockchain Application

Unit-3: INTRODUCTION TO BITCOIN [Lecture-10] [Marks-15]

Currency,Double Spending,Cryptocurrency, P2P Payment Gateway,Wallet, Bitcoin Mining:Purpose of Mining,Algorithm used in mining

Unit-4: Ethereum [Lecture-10] [Marks-15]

Ethereum network, EVM ,Transaction fee, Mist , Ether, gas ,Solidity - Smart contracts,Truffle ,Web3 ,Design and issue Cryptocurrency , Mining ,DApps ,DAO

Unit-5: HYPERLEDGER FABRIC V1.1	**[Lecture-10] [Marks-20]**
Introduction To Hyperledger Fabric V1.1, What is Hyperledger ,Why Hyperledger ,Where can Hyperledger be used , Hyperledger Architecture, Membership , Blockchain , Transaction , Chaincode , Hyperledger Fabric ,Features of Hyperledger	

Reference Books:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

Text Book

1.Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,
2.Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Course Outcomes: At the end of the course, student will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Explain the fundamental concepts, origin, and components of blockchain and distributed ledger technology (DLT)..	Remember(1), Understand(2)
CO2: Illustrate how blockchain operates including structure, lifecycle, and the role of various blockchain actors.	Understand(2), Apply (3)
CO3: Analyze the Bitcoin network, its transaction mechanism, mining process, and its role as a crypto currency.	Analyze(4), Remember(1)
CO4: Demonstrate the use of Ethereum platform and tools like Solidity, EVM, Web3, and smart contracts to create decentralized applications (DApps).	Apply (3), Create (6)
CO4:Evaluate the Hyperledger Fabric framework and describe its architecture, membership, chaincode, and practical use cases in enterprise-level applications.	Analyze(4), Evaluate(5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-513(A): Mobile Application Development
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-513(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1) Understand basics of mobile application development and get introduced Android platform and its architecture.
2) To learn activity creation and Android UI designing.
3) To be familiarized with Intent, Broadcast receivers and Internet services, SQLite Database and content providers; to integrate multimedia, camera and Location based services in Android Application

Unit-1: INTRODUCTION [Lecture-09][Marks-15]

Introduction to handheld devices (Palm, Pocket Pc, Symbian OS smart phones, MS windows based smart phones, BlackBerry, iphone etc.), features of handheld devices, Device Applications Vs Desktop application, overview of application development platforms (OS-Palm OS, Symbian, BlackBerry, Windows CE, OS for iphone, Android), Programming Languages (C/C++, JAVA), IDE tools. Comparison of Android with other Mobile OS. Comparative study of all versions of Android.

Unit-2: ANDROID BASICS, RESOURCES [Lecture-08][Marks-15]

Environment Setup, Architecture, Application Components, Hello World application, Resources, Activities, Services, Broadcast Receivers, Content Providers, Fragments, Intents.

Unit-3: USER INTERFACE [Lecture-05][Marks-10]

UI Layouts, UI Controls, Event Handling, Styles and Themes, Custom Components, Option menu, Context menu, Sub menu, Popup menu.

Unit-4: ADVANCED CONCEPTS [Lecture-05][Marks-5]

Drag and Drop, Notifications, Location Based Services, Sending Email, Sending SMS, Phone Calls, Publishing Android Application.

Unit-5: DATABASES [Lecture-3][Marks-5]

Understanding SQLite database generation, SQLite database management, Connection with SQLite, Retrieving data from SQLite, Storing data in database from application.

Reference Books:

1. Reto Meier. Professional Android Application Development, Wrox Publications ISBN: 978-0-470-34471-2.
2. Rick Rogers, John Lombardo, Zigurd Mednieks, G. Blake Meike. Android Application Development: Programming with the Google SDK. O'Reilly ISBN 10: 0596521472 / ISBN 13: 9780596521479.
3. Android Studio Cookbook , Packt Publishing ISBN-10: 1785286188

Course Outcomes: At the end of the course, students will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Understand the fundamental concepts of mobile application development and gain insight into handheld devices, mobile operating systems, and Android platform architecture.	Remember (1)

CO2: Set up the Android development environment and demonstrate the ability to create simple Android applications, utilizing Android components like Activities, Services, Broadcast Receivers, and Content Providers.	Understand (2)
CO3: Design and develop interactive Android User Interfaces using various UI components, layouts, event handling techniques, and menus to ensure an intuitive user experience.	Apply (3)
CO4: Implement advanced Android features such as drag-and-drop, notifications, location-based services, and integration of email, SMS, and phone functionalities within an Android application.	Analyze(4)
CO5: Design and manage databases in Android applications using SQLite to store, retrieve, and manage data, and integrate databases effectively within the application's flow.	Create(6)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-513(B): Lab on Mobile Application Development
W.E.F. 2024-25
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-513(B)**	UA Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objectives :

1) To gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment.
2) To learn designing of User Interface and Layouts for Android App, intents to broadcast data within and between Applications.
3) To use Content providers and Handle Databases using SQLite

1. Install and set up the Android development environment, including Android Studio and the necessary SDK components.
2. Develop a simple Android application that displays the message “Hello World” on the screen.
3. Develop an Android application that demonstrates the complete Android Activity Lifecycle with appropriate logging at each stage (onCreate, onStart, onResume, etc.).
4. Create an Android program that shows a DatePicker or TimePicker on button click, and displays the selected date or time using a TextView or Toast.
5. Create an Android program that shows the message "Welcome" in an AlertDialog box upon a button click.
6. Create an Android program to change the image displayed on the screen. Display two radio buttons with the names of two different images. On selection of a radio button, show the appropriate image in an ImageView.
7. Create an Android program to demonstrate the use of at least two different layouts in a single application.
8. Create an Android program that displays a Spinner, and shows the selected item using a Toast message.
9. Create an Android program that displays the message "Hello World" in an AlertDialog box upon a button click.
10. Demonstrate Implicit Intent and Explicit Intent in Android.
11. Create an Android program to demonstrate the use of an Options Menu.
12. Create an Android program to show a Context Menu on long-clicking a button.
13. Develop android application to demonstrate insert, update, delete using SQLite.

Course Outcomes: At the end of the course, students will be able to	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Install and configure the Android development environment using Android Studio, SDK tools, and cross-platform IDEs, and set up a C compiler in a virtual environment using VirtualBox.	Apply (3)

CO2: Design and develop Android user interfaces using layouts, views, widgets (e.g., DatePicker, Spinner, RadioButtons), and demonstrate event handling with various UI components.	Create (6)
CO3: Implement core Android components such as Activities, Intents (Implicit and Explicit), Dialogs, and Menus to build interactive mobile applications and manage navigation and communication between components.	Analyze(4)
CO4: Apply data persistence in Android applications by using SQLite databases and content providers to perform insert, update, delete, and retrieve operations effectively.	Apply (3)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-514(A): Business Intelligence
W.E.F.2024-25
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-514(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective :
1. Understand the fundamental concepts of Business Intelligence.
2. Explore data warehousing and OLAP concepts
3. Gain practical exposure to BI tools and dashboards
4. Analyze how BI supports decision-making processes.

Unit 1: Introduction to Business Intelligence [Lecture-05][Marks-12]

Definition and Importance of BI, BI Components and Architecture, Applications of BI in various domains, BI vs. Data Analytics.

Unit 2: Data Sources, Preprocessing, and Warehousing [Lecture-12][Marks-20]

Types of Data Sources (Operational Databases, External Data, Web Data, Big Data), Data Collection and Data Integration, Basic Data Preprocessing Techniques: Data Cleaning, Data Transformation, Data Reduction, Overview of Data Warehousing, Differences Between Operational Databases (OLTP) and Data Warehouses (OLAP), Role of ETL (Extract, Transform, Load) Processes in Data Warehousing.

Unit 3: BI Tools and Technologies [Lecture-06][Marks-10]

Overview of BI Tools (Power BI, Tableau, QlikView), Dashboards and Reporting, Real-time BI and Self-Service BI, Introduction to Big Data and BI integration.

Unit 4: BI Applications and Case Studies [Lecture-07][Marks-8]

BI in Finance, Healthcare, Retail, Case Study Analysis (1–2 examples), Challenges and Trends in BI.

Reference Books:

1. **Ramesh Sharda, Dursun Delen, Efraim Turban**, Business Intelligence: A Managerial Perspective on Analytics, Pearson Education, 4th Edition, 2017, ISBN: 9789353062016 — (Relevant for Unit 1, 3, 4: BI fundamentals, tools, case studies).
2. **Jiawei Han, Micheline Kamber, Jian Pei**, Data Mining: Concepts and Techniques,

Morgan Kaufmann/Elsevier, 3rd Edition, 2011, ISBN: 9780123814791 — (Relevant for Unit 2, 4: Data preprocessing and mining techniques).

3. **Cindi Howson**, Successful Business Intelligence: Unlock the Value of BI & Big Data, McGraw-Hill, 2nd Edition, 2013, ISBN: 9780071809184 — (Relevant for Unit 3, 4: BI strategy, trends, and real-world use cases).
4. **Paulraj Ponniah**, Data Warehousing Fundamentals for IT Professionals, Wiley, 2nd Edition, 2010, ISBN: 9780470462072 — (Relevant for Unit 2: ETL, OLTP vs OLAP, data warehousing).
5. **Mike Biere**, Business Intelligence for the Enterprise, IBM Press, 1st Edition, 2003, ISBN: 9780131413030 — (Relevant for Unit 1, 3: BI architecture and enterprise-level implementation).

Course Outcomes : At the end of the course, students will be able to	**Cognitive Level**
CO1: Explain BI concepts, architecture, and applications	Understand (2)
CO2: Identify data sources and apply preprocessing techniques.	Understand(2)
CO3: Demonstrate the use of modern BI tools to create dashboards and reports for decision-making.	Apply (L3)
CO4: Evaluate BI applications in domains like finance, healthcare, and retail.	Evaluate(5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-514(B): Lab on Business Intelligence
W.E.F. 2024-25
[Total Marks: External 30 + Internal 20 = Marks 50]

Semester	III	CIE Marks:	20
Course Code	**MCA-514(B)**	SEE Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objective:

1. To introduce students to Business Intelligence tools with a focus on Power BI and Excel for data-driven decision-making.
2. Enable data import, cleaning, and transformation from Excel and CSV files.
3. Understand and apply OLTP and OLAP concepts through simple database tasks.
4. Develop skills in building interactive charts and dashboards.

Install and set up Power BI Desktop.

1. Import data sources into Power Bi from various sources like Excel, CSV files.
2. Import a sales Excel file into Power BI and view the data.
3. Perform basic data cleaning using Power BI Power.
4. Perform basic transformation on raw data using Power BI.
5. Create bar charts, pie charts, and line graphs for visualizing sales data.
6. Add a card visual to display total revenue.
7. Create a clustered column chart for customer wise sales in Power BI.
8. Create a simple dashboard with 3 visuals (bar, pie, line).
9. Load multiple Excel sheets into Power BI and combine them using relationships.
10. Create a small DB, run transactional (OLTP) and analytical (OLAP) queries.
11. Create a matrix visual in Power BI to show sales by region and product.

Note:- You can use any open source dataset for assignments.

Course Outcomes: At the end of the course, students will be able to	**Cognitive Level**
CO1: Install and configure BI tools like Power BI and import data from various sources.	Understand (2)
CO2: Perform data cleaning and transformation using Power BI and Excel.	Apply(3)
CO3 Create basic data visualizations and interpret dashboards for business insights.	Apply(3)
CO4. Demonstrate ability to build interactive dashboards using slicers, cards, and charts.	Apply(3)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-515(A): Generative AI
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-515(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objectives:
This course aims at enabling students,
1. To learn the fundamentals of Neural Networks and their various types.
2. To explore Generative AI models like GANs, VAEs, and Transformers.
3. To analyze the limitations of traditional RNNs and LSTMs.
4. To discuss current trends and future directions in Generative AI research.

Unit-1: Foundations of AI and Neural Networks: **[Lecture-08] [Marks-13]**

History and evolution of AI/ML, Deep learning evolution, Transfer learning, History of Neural Natural Language Processing, Structure of Artificial Neural Networks, Steps in Training an Artificial Neural Network, Parameters and Hyper parameters, Back propagation..

Unit-2: Advanced Neural Network Architectures: **[Lecture-08] [Marks-13]**

Introduction to advanced architectures, Introduction to Generative AI Models: Generative Adversarial Networks (GANs), Variational Auto encoders (VAEs), Transformers, Attention Mechanism in detail Long Short-Term Memory Networks (LSTMs).

Unit-3: Data Preprocessing: **[Lecture-07] [Marks-12]**

Probability and Statistics, Data Preprocessing Techniques, Model Training Techniques

Unit-4: Generative AI Applications: **[Lecture-07] [Marks-12]**

Applications in Various Fields: Art and Creativity, Image and Video Generation, Text Generation, Music Composition, Healthcare Finance. Real-world use cases and challenges in deploying generative AI models

Reference Books:

1. "Generative Adversarial Networks Cookbook: Over 100 recipes to build generative models using Python, TensorFlow and Keras" by Josh Kalin, Packt Publishing, ISBN: 978-1789139907
2. “Generative AI in Software Development : Beyond the Limitations of Traditional Coding” Jesse Sprinter ,2024, ISBN: 9798865197393
3. “Generative AI for everyone: Understanding the essentials and applications of this breakthrough technology". Altaf Rehmani. , Bluerose Publishers Pvt. Ltd.,ISBN: 9789887042402
4. "Introduction to Generative AI”, Numa Dhamani,KindleEdition,2024. , Publisher: Manning, ISBN-13: 978-1633437197
5. "Neural Networks and Deep Learning: A Textbook" by Charu C. Aggarwal., Publisher: Springer, ISBN-13: 978-3031296413

Course Outcomes : After learning the course, the students should be able to:	**Cognitive Level**

CO 1: Understand the evolution of AI and the significance of Deep Learning.	Understand (Level 2)
CO 2: Apply various Neural Network architectures for tasks like image recognition and sequence modeling.	Apply (Level 3)
CO 3: Analyze data preprocessing and training techniques for neural networks.	Analyzing (Level 4)
CO 4: Design practical solutions using advanced neural networks for diverse applications.	Creating (Level 6)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-515(B): Lab on Generative AI
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-515(B)**	UA Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objectives:
This course aims at enabling students,
1. To learn Python and TensorFlow skills for Generative AI.
2. To study techniques for cleaning and preparing data for Generative AI tasks.
3. To implement generative AI models
4. To develop innovative applications using generative AI tools and techniques.

1. Write Python scripts to implement basic operations and TensorFlow 2 tensors.
2. Preprocess and clean datasets for Generative AI applications using Python libraries such as Pandas and NumPy. Handle missing data, normalize features, and encode categorical variables.
3. Use Matplotlib or Seaborn to visualize data distributions and patterns in Generative AI datasets. Plot histograms, scatter plots, and heatmaps to analyze data characteristics.
4. Implement a Generative Adversarial Network (GAN) architecture using TensorFlow 2. Train the GAN model on a dataset such as MNIST or CIFAR-10 for image generation tasks.
5. Implement Variational Auto encoders (VAE) wing Tensorflow for image generation
6. Text Generation: Implement a Long Short-Term Memory (LSTM) network using TensorFlow 2 for text generation tasks. Train the LSTM model on a dataset of text sequences and generate new text samples.
7. Text generation: Implement a Transformer-based language model (e.g., GPT) using TensorFlow 2 for text generation. Fine-tune the model on a text corpus and generate coherent and contextually relevant text.
8. Text generation: Develop applications for text generation tasks such as story generation, dialogue generation, or code generation using trained Generative AI models.

Note:- Student can use freely available datasets like

- MNIST, CIFAR-10 (images)
- IMDB, wikiTex-2 (text)
- Hugging Face Dataset Library

and tools like Google Colab (GPU access) Tensor Board (for Visualization)

Course Outcomes : After learning the course, the students should be able to:	**Cognitive Level**
CO1. Apply Python and TensorFlow basics, including data handling, visualization and preprocessing techniques.	Applying (Level 3)
CO2. Implement and compare Generative AI models such as GANs, VAEs, LSTM networks, and Transformer models for text generation and images.	**Applying (Level 3)**
CO3. Evaluate model performance and experiment with hyper parameters and optimization techniques to enhance Generative AI outcomes.	Evaluating (Level 5)

CO4. Develop innovative applications in text generation showcasing practical skills.	Creating (Level 6)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-516(A): UI and UX Design
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-516(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1. Understand the fundamentals of User Interface (UI) design, including usability, accessibility, and visual aesthetics.
2. Implement modern CSS3 styling techniques to enhance the user interface.
3. Control UI behavior using operators, conditionals, and loops in TypeScript.
4. Design modular and reusable UI components using TypeScript functions and classes.

Unit 1: Fundamentals of UI Design and HTML5 Structure [Lecture-06][Marks-12]

Introduction to User Interface Design, Principles of Good UI Design (Usability, Accessibility, Aesthetics), HTML5 and Semantic Structure for UI, HTML5 Doctype and Structure Tags (section, nav, article, aside, header, footer),Media Elements for Rich UI (video, audio), Drawing and Visual UI: canvas, svg etc.

Unit-2: Styling for UI with CSS3 [Lecture-06][Marks-10]

Role of CSS in UI Design, Modern CSS3 Selectors for Efficient Styling, CSS3 Properties for Better UI: Gradients, Shadows, Borders, Visual Feedback: Transitions, Transforms (2D/3D), and Animations , Opacity and Z-index for Layered UI

Unit-3: UI Logic with TypeScript – Basics [Lecture-06] [Marks-10]

Role of TypeScript in UI Layer Logic, Variables and Data Types for UI Interaction, Writing TypeScript for UI Events (e.g., button clicks, form submissions), Inferred Typing and Type Assertions in UI context

Unit-4: Operators, Decision Making And Loops [Lecture-06] [Marks-06]

Using Operators to Control UI Statement Conditional Statements for Dynamic UI, Loops for UI Elements (e.g., dynamically generating cards or menu items), break and continue for UI Interaction Control.

Unit 5: Components and Reusable UI with Functions & Classes [Lecture-8] [Marks-15]

Functional Approach to UI Design (event handlers, callbacks), Classes for Creating UI Components, Optional/Default/Rest Parameters in UI Features, Type Inference & Interfaces for Component Props, Interfaces and Inheritance for UI Component Hierarchy

Reference Books:

1. HTML5 Programmers reference. Reid,J.(2015) Apress.
2. Basarat Ali Syed, Beginning Node.js, A press, 2014,
3. Microsoft Corporation. TypeScript Language Specification, 0.9.5 edition, 2014. http://typescriptlang.orgS. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.
4. HTML and CSS: Design and Build Website by Jon Duckett Wiley
5. TypeScript Official Docs(https://www.typescriptlang.org/)

Course Outcomes: At the end of the course, students will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Design user interfaces using HTML5 principles, ensuring accessibility and semantic structure.	Create(6)
CO2: Create visually engaging and interactive UI components using advanced CSS3 techniques.	Create(6)
CO3: Implement TypeScript logic to manage user interactions in UI design.	Apply(3)
CO4:Build reusable UI Component using TypeScript Function, Classes and Interfaces	Create (6)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS (Integrated)
MCA-516(B): Lab on UI and UX Design
W.E.F. 2022-23
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CIE Marks:	20
Course Code	**MCA-516(B)**	SEE Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objectives:

1. Understand the basic structure and semantic elements in HTML5, including the usage of header, nav, section, article, aside, and footer tags to create a responsive webpage.
2. Apply HTML5 canvas and SVG to draw basic shapes like circles and rectangles, providing a foundation for web graphics.
3. Implement client-side validation for forms (name, email, password) using TypeScript to ensure proper input handling and validation.

1. Demonstrate Personal Webpage Using header, nav, section, article, aside, and footer tags.
2. Demonstrate Embed a video and audio file using HTML5 tags.
3. Demonstrate Draw basic shapes (circle, rectangle) using <canvas> and <svg>.
4. Demonstrate Use CSS3 gradients, shadows, opacity, and rounded borders.
5. Demonstrate Create a button with a hover transition.
6. Demonstrate Validate a form (name, email, password) using TypeScript.
7. Demonstrate Create a light/dark mode toggle switch using TypeScript.
8. Demonstrate Add, remove, and display tasks using loops and conditionals in TypeScript.
9. Demonstrate Use a TypeScript class to show/hide a modal popup.

Course Outcomes: After completion of this course student shall be able to -	**Cognitive Level (As Per Blooms Taxonomy)**
CO 1: Demonstrate understanding of HTML structure with semantic tags.	Understand(2)
CO 2: Apply CSS3 and TypeScript to validate forms and toggle UI states	Apply(3)
CO 3 Build Reusable UI components such as modal Using TypeScript Classes	Create(6)
CO 4: Create and manipulate a list of tasks using loops and conditionals.	Apply(3)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-517(A): Dev Ops
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-517(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objectives:

- Understand the DevOps Culture and Practices
- Explore DevOps Tools and Automation Concepts
- Gain Hands-on Experience with Version Control Using GIT
- Implement Configuration Management Using Chef

Unit-1: Introduction [Lecture-5][Marks-12]

Introduction to DevOps, SDLC models, Lean, ITIL, Agile, History of DevOps, DevOps Stakeholders, Important terminology, DevOps perspective, DevOps and Agile, DevOps Tools, Configuration management, Continuous Integration and Deployment, DevOps lifecycle stages

Unit-2: Version Control-GIT [Lecture-10][Marks-12]

Introduction to GIT, About Version Control System and Types, Difference between CVCS and DVCS ,GIT Basics, GIT Command Line, Installing Git, Installing on Windows, Initial setup, Git Essentials, Creating repository, Cloning, check-in and committing, Fetch pull and remote, Branching ,Creating the Branches, switching the branches, merging, Git vs GitHub.

Unit-3: Chef for configuration management [Lecture-10][Marks-14]

Overview of Chef: Common Chef Terminology (Server, Workstation, Client, Repository Etc.) Servers and Nodes Chef Configuration Concepts. Workstation Setup: How to configure knife Execute some commands to test connection between knife and workstation. Organization Setup: Create organization; Add yourself and node to organization, Test Node Setup: Create a server and add to organization, check node details using knife. Attributes: Understanding of Attributes, Creating Custom Attributes, Defining in Cookbooks. Data bags: Understanding the data bags, Creating and managing the Data bags.

Unit-4: Docker [Lecture-5][Marks-12]

What is a Docker, Use case of Docker, Platforms for Docker, Dockers vs. Virtualization, Architecture: Docker Architecture, Components of Docker, Installation of on windows, Docker file structure , Docker commands, What is Docker Hub, Custom images: Creating a custom image.

Reference Books:

1. DevOps for Developers: Michael Hüttermann
2. DevOps: A Software Architect's Perspective: Ingo M. Weber, Len Bass, and Liming Zhu
3. Building a DevOps Culture: Jennifer Davis, Katherine Daniels. Publisher: O'Reilly
4. Practical DevOps: Joakim Veronal
5. DevOps for Dummies: Gene Kim, Kevin Behr, George, Publisher: John Wiley & Sons

Web reference:

1. https://devops.com/
2. https://devopsinstitute.com/
3. https://aws.amazon.com/devops/

4. https://www.guru99.com/devops-tutorial.html
5. https://www.edureka.co/blog/maven-tutorial/
6. https://www.chef.io/configuration-management/
7. https://www.edureka.co/blog/devops-tutorial

Course Outcomes: After completion of this course student shall be able to -	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Understand DevOps Principles , Tools and Cultural Transformation in software development.	Understand(2)
CO 2: Apply Version Control using Git to manage source code and collaboration	Apply(3)
CO 3: Implement Configuration Management using Chef	Create(6)
CO 4: Understand and Utilize Docker for application Containerization	Understand(2)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA 517(B): Lab on Dev Ops
W.E.F. 2024-25
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA 517(B)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1. To introduce students to the concepts and importance of version control in software development.
2. To provide hands-on experience in creating and managing Git repositories.
3. To enable students to collaborate on projects using Git commands such as commit, branch, merge, push, and pull.
4. To implement GitHub operations including cloning, branch creation, and syncing repositories.

1. Demonstrate how to create GitHub account.

2. Exploring Git Commands through Collaborative Coding
   - Setting Up Git Repository
   - Creating and Committing Changes
   - Branching and Merging.

3. Implement GitHub Operations using Git
   - Cloning a Repository
   - Making Changes and Creating a Branch
   - Push/Pull Changes to GitHub

4. Create account on docker step by steps.

5. Demonstrate a practical on Version Control Tools.

6. Create a merge request on gitlab and Review the merge request.

7. To study docker file intructions, build an image for a sample web application using docker file.

Course Outcomes: After completion of this course student shall be able to -	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Describe the fundamental concepts and importance of version control systems in software development.	Understand(2)
CO2: Perform Git operations such as repository creation, commit, branching, and merging.	Apply(3)
CO3: Utilize GitHub to manage collaborative projects through cloning, pushing, and pulling code.	Apply(3)
CO4: Create and configure Docker accounts and pull OS images for containerized environments.	Apply / Analyze(3/4)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-518(A): E-Commerce Technologies and Management
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-518(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1. Introduce the fundamental concepts and components of E-Commerce, including its various types.
2. Understand and apply digital marketing tools and CRM strategies, focusing on SEO, email marketing
3. Create awareness of security threats and measures in e-commerce, focusing on network attacks, fraud prevention.

Unit-1: INTRODUCTION TO E-COMMERCE [Lecture-05][Marks-06]

Overview of E- Commerce, Applications of E-Commerce , Types of E-Commerce , Elements E-Commerce, Introduction to Online Auctions, Electronic Data Interchange, Electronic Payment Systems, Advantage and Disadvantages of E-Commerce

Unit-2: WEB PORTAL AND CROWD SOURCING [Lecture-05][Marks-06]

Introduction to Web Portal , Types of Web Portals , Crowd Sourcing, Introduction to TCP/IP, Understanding IP Addressing System

Unit-3: E-COMMERCE TECHNOLOGY [Lecture-06][Marks-15]

Web Development: HTML, CSS, JavaScript Basics, Backend Technologies: PHP, ASP.NET, Java, Python (Intro), Database Management for E-Commerce (MySQL/Oracle), Content Management Systems (CMS): WordPress, Magento, Shopify, E-Commerce API(Razorpay,PayPal)

Unit-4: E-COMMERCE MARKETING AND CRM [Lecture-07] [Marks-15]

Digital Marketing: SEO, Email Marketing, Social Media Marketing and Influencer Strategies, Analytics and Conversion Tracking, Customer Relationship Management (CRM) in E-Commerce, Strategic Planning and Business Models, E-Commerce Project Management

Unit-5: SECURITY IN E-COMMERCE [Lecture-07] [Marks-08]

Basic Concepts of Network Security, Types of network attacks: Interruption, Interception, Modification, Fabrication, E-Commerce Frauds and Preventions, Encryption, Protecting Web server with a Firewall, SSL Certificates, Multi-Factor Authentication and CAPTCHA

Reference Books:

1. Kenneth C. Laudon, E-Commerce : Business, Technology, Society, 4th Edition, Pearson
2. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison Wesley.
3. Kahate," Cryptography and Network Security", McGraw-Hill, Noida ISBN-13 : 9789353163303

Course Outcomes: At the end of the course, students will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**

CO1: Explain the concepts and applications of E-Commerce	Understand (2)
CO2: Understand the structure and functioning of web portals and crowdsourcing platforms	Understand (2)
CO3: Apply front-end and back-end technologies for Developing E-commerce system.	Apply (3)
CO4: Explain the principles of e-commerce security, including common network threats, fraud prevention techniques	Understand (2)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-518(B): Lab On E-Commerce Technologies and Management
W.E.F. 2024-25
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-518(B)**	UA Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objectives :

1. To enable students to design static web pages for online shopping websites using basic HTML and CSS.
2. To encourage exploration and customization of free e-commerce templates
3. To familiarize students with the process of domain name registration
4. To demonstrate the process of deploying websites on free hosting platforms

1. Create simple and static demo web page for online shopping site.
2. Create simple and static Feedback Form (web page) for online shopping site.
3. Download free templates of E-Commerce websites and modify it.
4. Create simple and static demo product catalog for online shopping site.
5. Demonstrate domain registration.
6. Create a dynamic shopping cart with product categories and user login.
7. Deploy Website using Free Hosting Platform for example(GitHub Pages)
8. Install WordPress locally add products and simulate a checkout process.

Course Outcomes: At the end of the course, students will be able to	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Design and develop basic static web pages for an e-commerce website using HTML and CSS.	Apply (3)
CO2: Understand the process of domain name registration and identify hosting services	Understand (2)
CO3: Deploy websites using free hosting platforms and manage via control Panel	Apply (3)
CO4: Install and configure WordPress locally, add products, and simulate a complete checkout process.	Apply (3)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA 519(A): SOCIAL MEDIA ANALYTICS
W.E.F.2025-26
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA 519(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1. To introduce the fundamental concepts and tools of Social Media Analytics.
2. To familiarize students with social network analysis, text mining, and user behavior analysis on various social media platforms.
3. To equip students with practical techniques for extracting and interpreting insights from social media data.
4. To apply analytics techniques to real-world case studies involving Facebook, Twitter, Instagram, and others.

Unit-1: ANALYTICS IN SOCIAL MEDIA AND TYPES OF ANALYTICS TOOLS [Lecture-08] [Marks-15]

Social Media Analytics : Introduction , Definition , Scope , Importance of social media for Business; The foundation for analytics, Social media data sources, Defining social media data, data sources in social media channels, Estimated Data sources and Factual Data Sources, Public and Private data, data gathering in social media analytics.

Unit-2: MAKING CONNECTIONS [Lecture-10][Marks-15]

Link analysis. Random graphs and network evolution. Social contexts: Affiliation and identity. Web analytics tools: Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing. Natural Language Processing Techniques for Micro-text Analysis.

Unit-3: WEB ANALYTICS **[Lecture-07] [Marks-10]**

Introduction, parameters, demographics. Analysing page audience. Reach and Engagement analysis. Post-performance on FB. Social campaigns. Measuring and analysing social campaigns, defining goals and evaluating outcomes, Network Analysis. (LinkedIn, Instagram, YouTube Twitter etc. Google analytics.)

Unit-4 PROCESSING AND VISUALIZING DATA [Lecture-05] [Marks-10]

Processing and Visualizing Data, Influence Maximization, Link Prediction, Collective Classification, Collecting and analyzing social media data; visualization and exploration.

Reference Books:

1. Matthew Ganis, Avinash Kohirkar, Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media, Pearson 2016.
2. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics, McGraw Hill Education, 978-0-07-176829-0.
3. Matthew A. Russell, Mining the Social Web, O'Reilly, 2nd Edition, ISBN:10: 1449367615.
4. Subhashini Tripathi Social Media Analytics for Beginners BPB publications

Course Outcomes: At the end of the course, students will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Understand the scope, sources, and types of data used in social media analytics.	Understand (2)
CO3: Analyze social media campaigns and interpret platform-specific metrics.	Analyze(4)

CO4: Compare and interpret analytics data from various social media platforms.	Compare (4)
CO5: Process, visualize and draw conclusions from social media datasets	Evaluate(5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-519(B): Lab on SOCIAL MEDIA ANALYTICS
W.E.F. 2025-26
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-519(B)**	UA Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objectives :

1. Understand and set up basic social media analytics tools including Facebook Insights, Twitter Analytics, and Google Analytics.
2. Perform real-time data collection from various social media platforms like Twitter, Facebook, YouTube, LinkedIn, or Web blogs.
3. Create and manage a Google Analytics account for tracking website/social media traffic.
4. Design interactive reports and dashboards using Google Data Studio.
5. Analyze performance metrics and reports from Facebook and Instagram advertising campaigns..

1. Setting up social media accounts for analytics (e.g., Facebook Insights, Twitter Analytics, Google Analytics)
2. Perform Data Collection from any of the social media platform of your choice (Twitter, Facebook, LinkedIn, Youtube, Web blogs etc).
3. Introduction to Google Analytics (https://analytics.google.com);create new account on google analytics
4. Creating a social media analytics report using Google Data Studio.
5. How to Run Ads on Social Media Platforms
6. Analyzing Facebook and Instagram Ads reports
7. Creating and Analyzing Effective Hashtags for Social Media Campaigns

Course Outcomes: At the end of the course, students will be able to	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Set up and use social media analytics tools across various platforms	Apply (3)
CO2: Collect and interpret real-world social media data for campaign analysis .	Analyze (4)
CO3: Visualize traffic and engagement insights using Google Data Studio	Create (6)
CO4: Evaluate ad performance and develop data-driven recommendations	Evaluate (5)
CO5: Design and monitor effective hashtag-based social media campaigns	Apply (3)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-520(A): Virtual and Augmented Reality
W.E.F.2024-25
[Total Marks : External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-520(A)**	UA Marks:	30
Contact Hours(L.T.P)	2:0:0	Exam Hours:	02

Course Objective:

1. Understand the fundamental concepts and evolution of Virtual Reality (VR) and Augmented Reality (AR).
2. Explore the hardware and software components used in VR/AR systems.
3. Learn about 3D interaction techniques and tracking methods.
4. Examine the design and development of VR/AR applications across various domains.
5. Future trends, challenges, and applications in immersive technologies.

Unit-1: Introduction to VR & AR [Lecture09] [Marks-15]

Introduction to VR & AR ,Definitions and history of VR and AR, Differences between VR, AR and MR, Applications and current trends

Unit-2: VR/AR Hardware and Software Components [Lecture-08] [Marks-15]

VR systems and architecture, AR systems and functionality, Input/output devices, Software frameworks and SDKs

Unit-3: 3D Interaction Techniques and Tracking [Lecture-05] [Marks 10]

3D user interfaces, Interaction metaphors, Tracking systems, Calibration and latency

Unit-4: Rendering and Visualization [Lecture-05] [Marks-5]

Shading models, Depth perception

Unit-5: Applications, Challenges, and Future Trends [Lecture-3] [Marks-5]

Case studies, Ethical issues, Future directions

Reference Books:

1. William R. Sherman & Alan B. Craig ,**Publisher**: Morgan Kaufmann, **Edition**: 2nd Edition (Updated version), **ISBN:** 9780128009659
2. Dieter Schmalstieg & Tobias Hollerer, **Publisher**: Addison-Wesley, **ISBN**: 9780321883575

Textbooks

1. Virtual Reality Engineering by Prof. M. Manivannan, IIT Madras.
2. Augmented Reality and Virtual Realit by Savitribai Phule Pune University.
3. Virtual Reality by Department of IT, IIIT-Allahabad.

Course Outcomes: At the end of the course, students will be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Define the concepts, history, and evolution of VR and AR.	Remember (1)
CO2: Describe the working principles of VR/AR hardware and tracking technologies.	Understand (2)

CO3: Demonstrate interaction techniques and rendering pipelines in immersive technologies.	Apply (3)
CO4: Analyze AR/VR applications across different industry sectors.	Analyze (4)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-520(B): Lab on Virtual and Augmented Reality
W.E.F. 2024-25
[Total Marks: External 30 + Internal 20 = 50 Marks]

Semester	III	CA Marks:	20
Course Code	**MCA-520(B)**	UA Marks:	30
Contact Hours(L.T.P)	0:0:4	Exam Hours:	03

Course Objectives :

1. Set up and configure Unity and AR/VR SDKs with minimal hardware.
2. Develop interactive AR/VR applications using lightweight tools.
3. Apply 3D object interaction techniques using keyboard/mouse.
4. Utilize mobile-based AR where applicable (GPS and camera tracking).

1. Setup Unity and Create a Basic 3D Scene
2. Virtual Walkthrough Without VR
3. Marker-Based AR Using Vuforia
4. Object Interaction via Mouse/Keyboard
5. Create an AR Info Panel Using UI
6. Educational AR: Solar System with Markers
7. GPS-Based AR App for Android

Course Outcomes: At the end of the course, students will be able to	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Configure and deploy development environments for creating AR/VR applications.	Apply (3)
CO2: Develop interactive AR/VR applications using appropriate SDKs and tools.	Create (6)
CO3: Implement tracking and user interaction techniques in immersive applications.	Apply (3)
CO4: Evaluate and optimize the performance of AR/VR applications.	Evaluate (5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-521: Research Project
W.E.F.2024-25
[Total Marks : External 60 + Internal 40 = 100 Marks]

Semester	III	CIE Marks:	40
Course Code	MCA-521	SEE Marks:	60
Contact Hours (L.T.P)	0:0:12	Exam Hours:	03

Course Objectives:

1. To inculcate research aptitude and scientific inquiry among students.
2. To enable students to identify real-world problems and define research questions.
3. To develop skills in designing, conducting, and documenting research.
4. To promote teamwork, ethical research practices, and dissemination of findings.

Theory (2 hours/week)

- Introduction to Research: Types, characteristics, ethics, plagiarism, IP rights
- Problem Identification: Literature review, framing research questions
- Research Design: Methodology, tools, hypothesis formulation, timeline creation
- Research Documentation: Technical writing, thesis structure, citation styles (IEEE/APA)
- Publication & Dissemination: Conferences, Journals, Project repositories (e.g., GitHub)
- Research Metrics: Impact Factor, h-index, altmetrics, referencing tools (Zotero, Mendeley)

Practical (4 hours/week)

• Weekly progress reviews and hands-on work
• Tool usage: Jupyter, VS Code, GitHub, Tableau, R, etc.
• Literature survey, data collection, analysis, validation
• Final output: Working model, documentation, presentation, Research Paper published in Journal

Internal Assessment Rubric (40 Marks)

1. **Problem Identification & Objective Clarity (10 Marks)**

- **Excellent (9-10)**: Highly relevant, original, and feasible with clear, concise objectives.
- **Very Good (7-8)**: Problem is relevant, feasible, and objectives are clear, but lacks originality.
- **Good (5-6)**: Problem is relevant but lacks clear originality or objectives are somewhat unclear.
- **Fair (3-4)**: Problem is unclear or lacks feasibility, with poorly defined objectives.
- **Poor (0-2)**: Problem is not relevant or clearly defined, and objectives are missing or vague.

2. **Literature Review & Research Gap (5 Marks)**
• **Excellent (5)**: In-depth review with highly relevant and up-to-date references and a clear research gap.
• **Very Good (4)**: Comprehensive review with relevant references and a defined research gap.
• **Good (3)**: Adequate review, some relevant references, but research gap is only partially defined.
• **Fair (2)**: Limited review with few references and a vague research gap.
• **Poor (0-1)**: Minimal or irrelevant review, with no clear research gap.
3. **Methodology Design & Implementation (10 Marks)**
• **Excellent (9-10)**: Highly technical, innovative design with clear and effective implementation.
• **Very Good (7-8)**: Technical design and implementation are strong, but with minor gaps or room for improvement.
• **Good (5-6)**: Good technical design, but lacks some innovation or has minor implementation issues.
• **Fair (3-4)**: Methodology is weak, lacks innovation, or has major implementation problems.
• **Poor (0-2)**: Weak or incomplete methodology with significant implementation flaws.
4. **Weekly Progress and Log Book (5 Marks)**
• **Excellent (5)**: Detailed, consistent updates with all milestones achieved on time.
• **Very Good (4)**: Regular updates, most milestones achieved, and good participation.
• **Good (3)**: Some progress and updates, but with occasional delays or missing milestones.
• **Fair (2)**: Limited updates with many missed or delayed milestones.
• **Poor (0-1)**: No updates, missing milestones, or poor participation.
5. **Interim Report / Presentation (5 Marks)**
• **Excellent (5)**: Excellent presentation with thorough understanding, clear articulation, and effective Q&A responses.
• **Very Good (4)**: Solid presentation with minor gaps in understanding or Q&A responses.
• **Good (3)**: Clear presentation but lacks depth in some areas or unclear Q&A responses.
• **Fair (2)**: Weak presentation, lacks depth or clarity, and inadequate Q&A responses.

- **Poor (0-1)**: Poor presentation, unclear or insufficient Q&A responses.

6. **Viva/Discussion (5 Marks)**

- **Excellent (5)**: Excellent understanding and articulation with clear justification of decisions.
- **Very Good (4)**: Strong understanding and good justification with minor articulation gaps.
- **Good (3)**: Adequate understanding with some difficulty articulating decisions.
- **Fair (2)**: Limited understanding, weak justification, or poor articulation.
- **Poor (0-1)**: Poor understanding and unclear justification during the interaction.

Component	Marks	Description
Problem Identification & Objective Clarity	10	Relevance, originality, and feasibility of problem defined
Literature Review & Research Gap	5	Review depth, relevance of references, research novelty
Methodology Design & Implementation	10	Technical soundness, tools/tech used, innovation
Weekly Progress and Log Book	5	Regular updates, milestones achieved, participation in review sessions
Interim Report / Presentation	5	Mid-project oral or poster presentation with Q&A
Viva/Discussion	5	Concept clarity, justification of decisions, articulation during interaction

External Assessment Rubric (60 Marks)

1. **Final Report (15 Marks)**

- **Excellent (13-15)**: Well-structured, clear, professional report with flawless citations and < 10% plagiarism.
- **Very Good (10-12)**: Well-written with minor formatting issues, good citations, and < 10% plagiarism.
- **Good (7-9)**: Clear report with minor structure or citation issues, and < 10% plagiarism.
- **Fair (4-6)**: Report has several structural or citation issues and < 20% plagiarism.
- **Poor (0-3)**: Poorly written with major structure, citation, or plagiarism issues.

2. **Implementation/Prototype (20 Marks)**

- **Excellent (18-20)**: Fully functional model with high quality, innovative solutions, and thorough testing.
- **Very Good (14-17)**: Working model with few minor issues or limited innovation, well-tested.

- **Good (10-13)**: Functional prototype, but with some issues or lacking innovation.
- **Fair (6-9)**: Model is functional but lacks quality, testing, or has significant issues.
- **Poor (0-5)**: Prototype is incomplete, non-functional, or lacks testing.

3. **Final Presentation (15 Marks)**

- **Excellent (13-15)**: Engaging, clear presentation with excellent visual aids, confident articulation, and effective Q&A.
- **Very Good (10-12)**: Strong presentation with good visual aids, clear articulation, and solid Q&A responses.
- **Good (7-9)**: Solid presentation, but lacks engagement or clarity in some areas.
- **Fair (4-6)**: Presentation lacks engagement or clarity, and weak Q&A performance.
- **Poor (0-3)**: Poor presentation, unclear visuals, weak articulation, or Q&A responses.

4. **Viva Voce (10 Marks)**

- **Excellent (9-10)**: Exceptional understanding, depth of research, confident, and articulate during discussion.
- **Very Good (7-8)**: Strong understanding with good articulation and research depth.
- **Good (5-6)**: Adequate understanding with some lack of depth or unclear articulation.
- **Fair (3-4)**: Limited understanding and weak articulation, with lacking depth of research.
- **Poor (0-2)**: Poor understanding, unclear articulation, and shallow research.

Component	**Marks**	**Description**
Final Report	15	Format, content, writing style, citations, plagiarism < 10%
Implementation/Prototype	20	Working model/simulation quality, tool application, results
Final Presentation	15	PPT, articulation, Q&A, visual aids, publication/presentation of the work on the reputed platform
Viva Voce	10	Overall understanding, depth of research, confidence

Conduction Details

Internal Evaluation (40 Marks)

• Faculty guide assigned per student.
• Proposal submission within 1 weeks of semester start.
• Weekly logbook maintenance.
• Final viva by guide

External Evaluation (60 Marks)

• Submission: Report + Soft copy.
• Conducted by External + Internal examiner.
• 15–20 mins per student or 30–35 mins per group.
• Includes demo, presentation, viva.

Course Outcomes : After completion of this course students shall be able to-	**Cognitive Level (As Per Blooms Taxonomy)**
CO1: Identify and define a real-world research problem.	Understand (2)
CO2: Conduct literature survey and identify research gaps.	Analyze (4)
CO3: Formulate hypothesis or objectives and design methodology.	Apply (3)
CO4: Develop working models/simulations/prototypes based on selected tools.	Create (6)
CO4: Present research findings in the form of a report and oral/poster presentation.	Evaluate (5)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-531: Massive Open Online Course-1 (NPTEL, Swayam)

W.E.F.2024-25
[Total Marks : External 100 Marks]

Semester	IV	CA Marks:	--
Course Code	MCA-531	UA Marks:	100
Contact Hours (L.T.P)	4:0:0	Exam Hours:	03 Hrs

Course Objectives:
This course aims at enabling students,

1. Supplement traditional classroom learning through exposure to online academic and industry-led content.
2. Encourage self-paced and self-directed learning via reputed global platforms like NPTEL, SWAYAM.
3. Familiarize students with advanced, trending, and industry-relevant technologies beyond the university curriculum.
4. Foster continuous learning habits to match industry expectations and technological evolutions.
5. Promote the use of globally available MOOCs to gain practical insights and certifications from top institutions.

Key Guidelines:

1. Course Selection Criteria

- The BoS (Computer Science) will select the course (MCA-531: Massive Open Online Course-1) from Swayam/NPTEL before the start of the semester based on availability during January-May Semester and current industry needs from the available NPTEL courses. The course selected by the BoS for that year/semester will be informed to the respective Colleges/Institutes Principal/Director.

- If the Course on NPTEL is 3 Credit Course, then the marks obtained in the course will be converted to 4 Credit Course.

2. Assessment and Evaluation

- Students must successfully complete the course and submit the certification of completion/pass.

- Examination for the SWAYAM Course will be conducted in two different ways:

A) National Testing Agency (NTA) and National Programme on Technology Enhanced Learning (NPTEL) conduct the end term proctored SWAYAM Examinations at designated centres across the country. Subsequently, NTA & NPTEL will announce the results.

B) The University will also conduct the term-end Examination for all the students, who have enrolled for the SWAYAM course selected for credit transfer.

3. Submission Timeline

- Proof of course completion must be submitted at least two weeks before final semester exams.
- Failure to submit or pass will result in non-allocation of credits for that semester.

NOTE: The guidelines (SOP) provided by the university from time to time will be followed (if any) in the conduct of the course.

Course Outcomes : After learning the course, the students should be able to:	**Cognitive Level**
CO 1.Identify and select appropriate MOOC courses aligned with academic and career goals.	Remembering (Level 1)
CO 2. Demonstrate understanding of new and emerging technologies learned through MOOCs.	Understanding (Level 2)
CO 3. Apply the acquired knowledge and skills from MOOC to practical scenarios or mini-projects.	Applying (Level 3)
CO 4. Analyze concepts learned and present learning through assignments, discussions, or presentations.	Analyzing (Level 4)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-532: Massive Open Online Course-2 (NPTEL, Swayam)

W.E.F.2024-25
[Total Marks : External 100 Marks]

Semester	IV	CA Marks:	--
Course Code	MCA-532	UA Marks:	100
Contact Hours (L.T.P)	4:0:0	Exam Hours:	03 Hrs

Course Objectives:
This course aims at enabling students,

1. Supplement traditional classroom learning through exposure to online academic and industry-led content.
2. Encourage self-paced and self-directed learning via reputed global platforms like NPTEL, SWAYAM.
3. Familiarize students with advanced, trending, and industry-relevant technologies beyond the university curriculum.
4. Foster continuous learning habits to match industry expectations and technological evolutions.
5. Promote the use of globally available MOOCs to gain practical insights and certifications from top institutions.

Key Guidelines:

1. Course Selection Criteria

- The BoS (Computer Science) will select the course (MCA-532: Massive Open Online Course-2) from Swayam/NPTEL before the start of the semester based on availability during January-May Semester and current industry needs from the available NPTEL courses. The selected course by the BoS for that year/semester will be informed to the respective Colleges/Institutes Principal/Director.

- If the Course on NPTEL is 3 Credit Course, then the marks obtained in the course will be converted to 4 Credit Course.

2. Assessment and Evaluation

- Students must successfully complete the course and submit the certification of completion/pass.

- Examination for the SWAYAM Course will be conducted in two different ways:

A) National Testing Agency (NTA) and National Programme on Technology Enhanced Learning (NPTEL) conduct the end term proctored SWAYAM Examinations at designated centres across the country. Subsequently, NTA & NPTEL will announce the results.

B) The University will also conduct the term-end Examination for all the students, who have enrolled for the SWAYAM course selected for credit transfer.

3. Submission Timeline

- Proof of course completion must be submitted at least two weeks before final semester exams.
- Failure to submit or pass will result in non-allocation of credits for that semester.

NOTE: The guidelines (SOP) provided by the university from time to time will be followed (if any) in the conduct of the course.

Course Outcomes : After learning the course, the students should be able to:	**Cognitive Level**
CO 1.Identify and select appropriate MOOC courses aligned with academic and career goals.	Remembering (Level 1)
CO 2. Demonstrate understanding of new and emerging technologies learned through MOOCs.	Understanding (Level 2)
CO 3. Apply the acquired knowledge and skills from MOOC to practical scenarios or mini-projects.	Applying (Level 3)
CO 4. Analyze concepts learned and present learning through assignments, discussions, or presentations.	Analyzing (Level 4)

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon
Faculty of Science and Technology
MASTER OF COMPUTER APPLICATIONS
MCA-533: On Job Training (Internship)
W.E.F.2024-25
[Total Marks : External 300 = 300 Marks]

Semester	**IV**	CIE Marks:	--
Course Code	**MCA-533**	SEE Marks:	**300**
Contact Hours (Total) (P)	**360**	Exam Hours:	**03 Hr.**

Course Objectives:

1.To develop job-specific practical skills.
2.To apply academic knowledge in real work settings.
3.To learn workplace tools, systems, and processes.
4.To improve efficiency and productivity.
5.To build confidence and work independently.
6.To understand industry standards and workplace culture.

1. OJT Objectives:

An OJT Programme in general sets out to achieve objectives such as-

1. Align classroom learnings with workplace outcomes.
2. Provide students with real-world work experience and align their expectations with job demands.
3. Combine physical and digital learning modes in industry settings, blended with mentorship.
4. Foster research skills, including knowledge discovery, analytical tools, methodologies, and ethical conduct.
5. Introduce students to emerging technologies and their applications in various fields.

6. Strengthen students' entrepreneurial skills and encourage job creation.
7. Facilitate problem-solving, decision-making, teamwork, and collaboration.
8. Foster social awareness and philanthropic values among students.
9. Encourage collaboration between Higher Education Institutes (HEIs), industry, and academia for internships and research opportunities.
10. In still professional principles, ethics, values, and integrity to meet employment market demands and social needs.

2. OJT outcomes:

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

- Apply concepts learned in classrooms to real-world work environments, enhancing their understanding and skills.
- Show insights into the challenges, opportunities, and culture of different workplaces, preparing them for future employment.
- Navigate through various learning modalities effectively through exposure to hybrid learning models.
- Show evidence of research aptitude and skills of critical thinking, analytical skills, and ethical research conduct in the conduct, and communication of their work
- Use and appreciate the use of emerging technologies and their applications, enhancing their technological literacy and adaptability.
- Display problem-solving abilities in making informed decisions in complex scenarios through practical situations.
- Work in teams and collaborate to achieve common goals in diverse work environments through collaborative projects.
- Give examples and cite ways of contributing to the field of work in a manner that displays social responsibility and sustainability.
- Display integrity in their dealings with their work and the people that they interact with by upholding professional; principles and ethical standards.

3. Role and responsibilities

Head of the Department (HOD):-

- To conduct an orientation session to familiarize students with the OJT purpose and process.
- To establish the code of conduct for the training period and guide students.
- To Assign department faculty members as mentors to OJT students.
- To ensure the OJT program aligns with departmental and institutional academic objectives.
- To Provide resources, training, or assistance to ensure effective supervision.

OJT Coordinator: -

- To oversee the quality and effectiveness of the OJT program.
- To establish mechanisms for evaluating the program and making improvements.
- To act as a liaison between the department, students, faculty mentors, and OJT supervisors (Host institute/organization)

Faculty Mentor: -

- To assist in identifying OJT opportunities
- To monitor student progress and provide guidance
- To review and approve OJT plans

- To collect and review progress reports
- To evaluate OJT documentation including reports, presentations, or other required deliverables (if applicable)

Student Role with Internal Guide:-

- Project report must be prepared in LATEX Or appropriate documentation tool.
- Submit IT joining Letter Stamped & Sealed by authentic authority.
- Give brief report on your progress weekly one through email or LMS
- Report includes all documentary of project report chapter wise.
- If any changes in Communication Mobile, Email ID, etc give it to concern College Internal Guide and IT Coordinator.
- If you face any problem such as not getting IT, Any Bond with company, Certificate from company, Duration of IT, Size of project, leave for Mid Term exam, Internal or External Exam, etc. Discuss with Internal Guide.
- Soft copy of Final Project Report must be approved from Internal Guide then take print of it.

4. Evaluation of OJT:

Evaluation during the OJT program involves following key components: External Evaluation for 300 Marks.

The suggested evaluation grid for the assessment:

External (OJT Supervisor, for instance)	**Presentation (Oral)**	**Questions and Answers**	**CR Report**	**Project Report (Hardbound)**	**Total Marks**
Marks	75	75	75	75	300
Total					**300**

Course Outcomes : At the end of the course, students will be able to	**Cognitive level**
CO1. Recall key concepts, terminology, and tools related to the field	**Remembering(1)**
CO2. Understand core processes and methodologies applicable in the professional environment	**Understanding(2)**
CO3. Apply learned knowledge to perform tasks and solve real-world problems in the field	**Applying(3)**
CO4. Analyze workplace situations, identify issues, and propose solutions for improvement	**Analyzing(4)**
CO5. Evaluate strategies and propose new solutions based on experience and learned knowledge	Evaluating(5)
CO6. Design and develop innovative solutions, strategies, or processes based on the knowledge and experience gained throughout the course	Creating(6)