Dr. Ambedkar Institute of Technology, Bengaluru-56

(An Autonomous Institution, Affiliated to VTU, Approved by AICTE, Accredited by NAAC with A+ grade)

Master of Computer Applications Program

(Accredited by National Board of Accreditation)

Scheme 2024 – 2026
MCA I – IV Semester

For the Academic Year 2025-26

Dr. Ambedkar Institute of Technology, Bengaluru-56

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Master of Computer Applications

Institute - Vision and Mission

Vision

To create Dynamic, Resourceful, Adept and Innovative Technical professionals to meet global challenges.

Mission

- **To offer state-of-the-art under graduate, post graduate and doctoral programs in the fields of Engineering, Technology and Management**
- **To generate new knowledge by engaging faculty and students in research, development and innovation.**
- **To provide strong theoretical foundation to the students, supported by extensive practical training to meet the industrial requirements.**
- **To instil moral and ethical values with social and professional commitment.**

DEPARTMENT - VISION AND MISSION

VISION

To create a quality human resource with good technical competence to face the global challenges.

MISSION

- **To create a Centre of Excellence through industry institute interaction.**
- **To prepare students for utilizing more creativity, innovativeness and leadership Qualities.**
- **To inculcate a sense of commitment to the students towards socio-economic development of the nation**

Program Educational Objectives

PEO 1: Apply the principles of software engineering and application development in verticals related to Information Technology and Information Technology Enabled services (ITES).

PEO 2: Inculcate creative and innovative ideas with latest developments in the industry to be displayed as an entrepreneur, or a researcher or academician.

PEO 3: To incorporate the lifelong learning process with leadership skills and corporate social responsibilities.

Program Outcomes:

PO 1: Ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer based systems.

PO 2: Graduates will be able to demonstrate with excellent programming, analytical, logical and problem solving skills.

PO 3: Graduates will be able to design a computing system to meet desired needs within realistic constraints such as safety, security and applicability.

PO 4: An ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO 5: An ability to select modern computing tools and techniques and use them with dexterity.

PO 6: An ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO 7: An ability to appreciate the importance of goal setting and to recognize the need for life-long learning.

PO 8: Develop and maintain medium to large scale application software using theoretical and applied knowledge of software engineering and project management.

PO 9: An ability to communicate effectively.

PO 10: An ability to understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development.

PO 11: An ability to execute the project either individually or in a group.

PO 12: An ability to become an Entrepreneur in the field of information technology to create a value and wealth for the betterment of the individual and society at large.

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Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA FIRST SEMESTER 2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	PCC	MCAT11	Object Oriented Programming using Java	3	-	-	3	50	50	100	3
2	PCC	MCAT12	Web Technologies	3	-	-	3	50	50	100	3
3	PCC	MCAT13	Computer Networks	3	-	-	3	50	50	100	3
4	BSC	MCAT14	Mathematical Foundations for Computer Applications	3	-	-	3	50	50	100	3
5.	IPCC	MCAU15	Data Structures and Algorithms	3	-	2	3	50	50	100	4
6	IPCC	MCAU16	Fundamentals of C Programming	3	-	2	3	50	50	100	4
7	PCCL	MCAL17	Object Oriented Programming using Java Lab	-	-	2	3	50	50	50	1
8	PCCL	MCAL18	Web Technologies Lab	-	-	2	3	50	50	50	1
9	NCMC	MCAT19	Mathematics Bridge Course For MCA	3	-	-	3	50	50	100	PP
10	NCMC	MCACDN 110	Placement Training	4	-	-	-	-	50	50	PP
Total				18	-	08	27	450	500	950	22

Note:

PCC : Professional Core Course
BSC : Basic Science Course
AEC : Ability Enhancement Course
T : Theory
L : Lab
CDN : Career Development Non-Credit Course
PCCL : Professional Core Course Lab
NCMC: Non-Credit Mandatory Course
IPCC : Integrated Professional Core Course
U : Integrated
M : Mini project

Bridge Course: Non-Credit Mandatory Course MMAT108-Mathematics for MCA Students: Students who have not taken Mathematics at the 10+2 or degree level are required to study and pass this course in the 1st semester. However, this course/subject will not be considered for vertical progression.

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Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA SECOND SEMESTER 2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignmen	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	PCC	MCAT21	Python Programming	3	-	-	3	50	50	100	3
2	PCC	MCAT22	Software Engineering	3	-	-	3	50	50	100	3
3	PCC	MCAT23	Data Science	3	-	-	3	50	50	100	3
4	IPCC	MCAU24	Database Management System	2	-	2	3	50	50	100	3
5	IPEC	MCAU25x	Elective –1	2	-	2	3	50	50	100	3
6	PEC	MCAT26x	Elective - 2	3	-	-	3	50	50	100	3
7	PCCL	MCAL27	Python Programming Lab	-	-	2	3	50	50	100	1
8	PCCL	MCAL28	Data Science Lab	-	-	2	3	50	50	100	1
9	PBLC	MCAM29	Mini Project-1	-	2	2	3	50	50	100	2
10	NCMC	MCACDN210	Placement Training	4	-	-	-	-	50	50	PP
11	NCMC	MRMI211	Research Methodology and	Classes and evaluation procedures are as per the policy of the online course providers.							PP
Total				16	02	10	27	450	500	950	22

Note:

PCC : Professional Core Course
PCCL : Professional Core Course Lab
IPEC : Integrated Professional Elective Course
T : Theory
L : Lab
NCMC: Non-Credit Mandatory Course
MRMI: Research Methodology & IPR
PEC : Professional Elective Course
IPCC : Integrated Professional Core Course
PBCL : Project Based Learning Course
U : Integrated
M : Mini project
CDN : Career Development Non-Credit Course

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Department of Master of Computer Applications

MCA SECOND SEMESTER ELECTIVE COURSES

Elective – 1

S.No	Course Type	Course Code	Course Title
1.	IPEC	MCAU251	Cloud Essentials
2.	IPEC	MCAU252	Big Data Analytics
3.	IPEC	MCAU253	Go Programming

Elective – 2

S.No	Course Type	Course Code	Course Title
1.	PEC	MCAT261	Software Architecture
2.	PEC	MCAT262	Soft Computing
3.	PEC	MCAT263	Software Testing and Automation

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Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA THIRD SEMESTER
2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	IPCC	MCAU31	Machine Learning and Deep Learning	3	-	2	3	50	50	100	4
2	IPCC	MCAU32	Full Stack Web Development	3	-	2	3	50	50	100	4
3	IPEC	MCAU33x	Specialization-1	3	-	2	3	50	50	100	4
4	IPEC	MCAU34x	Specialization-2	3	-	2	3	50	50	100	4
5	PBLC	MCAM35	Mini Project-2	-	-	4	3	50	50	100	2
6	INT	MCAI36	Industry Internship	-	-	-	-	50	50	100	2
Total				9	-	10	12	300	300	600	20

Note:

PBLC : Project Based Learning Course
IPEC : Integrated Professional Elective Course
INT : Internship
SDC : Skill Development Course

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Department of Master of Computer Applications

MCA THIRD SEMESTER PROFESSIONAL ELECTIVE COURSES

Specialization-1: Artificial Intelligence and Analytics

S.No	Course Type	Course Code	Course Title
1.	IPEC	MCAU331	Internet of Things
2.	IPEC	MCAU332	Artificial Intelligence
3.	IPEC	MCAU333	Introduction to Generative AI
4.	IPEC	MCAU334	Web Marketing and Analytics

Specialization-2: Software System and Security

S.No	Course Type	Course Code	Course Title
1.	IPEC	MCAU341	Operating Systems and Linux System Programming
2.	IPEC	MCAU342	Project Management with Scrum and git
3.	IPEC	MCAU343	DevOps
4.	IPEC	MCAU344	Cyber Security

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Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA FOURTH SEMESTER
2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	NCMC	MMC41	MOOC	Classes and evaluation procedures are as per the policy of the online course providers.							PP
2.	SEC	MCAS42	Technical Seminar	-	2	-	3	-	50	50	02
3.	PROJ	MCAP43	Project Work	1 SEMESTER DURATION			3	100	50	150	14
			Total	-	-	-	3	100	100	200	16
Grand Total											
Total Marks: 2700							Total Credits: 80				

Note:
SEC : Skill Enhancement Course
PROJ : Project Work
MRMI: Research Methodology & IPR
NCMC: Non-credit Mandatory Course
PP : Passing is Mandatory
MOOC: Massive Open Online Course

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Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA INTERDEPARTMENT ELECTIVE (AUTONOMOUS) 2024-2026

Sl. No.	Course Code	Course Type	Course Title	Teaching hours per week			Examination				Credits	Eligibility
				Lecture	Tutorial/ Seminar/ Assignme	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks		
1	MCT6051	OEC	Data Science using Python	3	-	-	3	50	50	100	3	All Branches
3.	MCT6052	OEC	R programming for data Science	3			3	50	50	100	3	All Branches
4.	MCT6053	OEC	Full stack web development	3			3	50	50	100	3	CSE ISE
5.	MCT6054	OEC	Ethical Hacking	3			3	50	50	100	3	All Branches

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Department of Master of Computer Applications

Curriculum Distribution for MCA 2024 Scheme

Course Type	Semester-1 Credits	Semester-2 Credits	Semester-3 Credits	Semester-4 Credits	Total Credits
Basic Science Course (BSC)	3	-	-	-	3
Professional Core Course (PCC)	9	9	-	-	18
Professional Elective Course (PEC)	-	3	-	-	3
Integrated Professional Core Course (IPCC)	8	3	8	-	19
Integrated Professional Elective Course (IPEC)	-	3	8	-	11
Labs (PCCL)	2	2	-	-	4
Mini Project (PBLC)	-	2	2	-	4
Seminar (SEC)	-	-	-	2	2
Internship (INT)	-	-	2	-	2
Project Work (PROJ)	-	-	-	14	14
Total Credits	22	22	20	16	80

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Department of Master of Computer Applications

Credits for the Two-Years MCA Program- Scheme 2024
(AUTONOMOUS) 2024-2026

	Credits for the TWO Year MCA Program- Scheme 2024					
Semester	**Core**	**Practical**	**Elective**	**Project / Industry Internship**	**Total Credits**	**Total Marks**
I	**20**	**2**	**0**	**0**	**22**	**950**
II	**12**	**2**	**6**	**2**	**22**	**950**
III	**-**	**-**	**12**	**8**	**20**	**600**
IV	**-**	**-**	**-**	**16**	**16**	**200**
Total					**80**	**2700**

ASSESSMENT DETAILS (BOTH CIE AND SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

- **Three Tests conducted (Average of best two of three CIE tests conducted) for each of 30 Marks (duration 01 hour 30 minutes)**
- **Assignments covering all COs assessed of 10 Marks:**
- **Course Seminar suitably planned to attain the COs and POs assessed for 5 Marks.**
- **Group Activity assigned covering all Cos and mapping POs as assessed for 5 Marks.**

CIE Evaluation components

Assessment	Max. Marks	Min. Passing marks
Average of two CIE tests conducted	30	15
Assignment	10	5
Seminar	5	2.5
Group Activity	5	2.5
Total	50	25

CIE for the practical component of IPCC

- **On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.**
- **The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 05 marks shall be for the test conducted at the end of the semester.**
- **The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report.**
- **Each experiment report can be evaluated for 10 are added and scaled down to 15 marks. The laboratory test at the end /after completion of all the experiments shall be conducted for 50 marks and scaled down to 05 marks.**
- **Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 20 marks.**

SEMESTER END EXAMINATION (SEE):

- **The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.**
- **The question paper will have ten full questions carrying equal marks.**
- **Each full question is for 20 marks. There will be two full questions (with a maximum of four sub questions) from each module.**
- **Each full question will have a sub-question covering all the topics under a module.**
- **The students will have to answer five full questions, selecting one full question from each module**

SEE for IPCC

Theory SEE will be conducted by college as per the scheduled timetable, with common question papers for the course (duration 03 hours)

1. **The question paper will be set for 100 marks and marks scored will be scaled down proportionately to 50 marks.**
2. **The question paper will have ten questions. Each question is set for 20 marks.**
3. **There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.**
4. **The students have to answer 5 full questions, selecting one full question from each module.**

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

The minimum marks to be secured in CIE to appear for SEE shall be the 15 (50% of maximum marks-30) in the theory component and 10 (50% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only.

However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50. (Student has to secure an aggregate of 50% of maximum marks of the course (CIE+SEE)

Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA FIRST SEMESTER 2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	PCC	MCAT11	Object Oriented Programming using Java	3	-	-	3	50	50	100	3
2	PCC	MCAT12	Web Technologies	3	-	-	3	50	50	100	3
3	PCC	MCAT13	Computer Networks	3	-	-	3	50	50	100	3
4	BSC	MCAT14	Mathematical Foundations for Computer Applications	3	-	-	3	50	50	100	3
5.	IPCC	MCAU15	Data Structures and Algorithms	3	-	2	3	50	50	100	4
6	IPCC	MCAU16	Fundamentals of C	3	-	2	3	50	50	100	4
7	PCCL	MCAL17	Object Oriented Programming using Java Lab	-	-	2	3	50	50	50	1
8	PCCL	MCAL18	Web Technologies	-	-	2	3	50	50	50	1
9	NCMC	MCAT19	Mathematics Bridge Course For MCA	3	-	-	3	50	50	100	PP
10	NCMC	MCACDN110	Placement Training	4	-	-	-	-	50	50	PP
Total				18	-	08	27	450	500	950	22

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Semester	I						
Course Title	**OBJECT ORIENTED PROGRAMMING USING JAVA**						
Course Code	**MCAT11**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **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**
- **Able to Design client server application in java**

UNIT I: Java Programming Fundamentals **08 hours**

The Java Language, The Key Attributes of Object-Oriented Programming, A First Simple Program, Handling Syntax Errors

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.

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.

UNIT II: Introducing Classes, Objects and Methods **08 hours**

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 Finalizes, 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, Var args: 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.

UNIT III: Interfaces **08 hours**

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.

UNIT IV: Multithreaded Programming **08 hours**

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)

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

UNIT V: Networking with Java.net **08 hours**

Networking fundamentals, The Networking classes and Interfaces, The InetAddress class, The Socket Class, The URL class, The URL Connection Class, The HttpURL Connection Class.

Exploring Collection Framework: Collections Overview, The Collection Interfaces, The collection Classes. The Arrays Class

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

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.

TEXT BOOKS

1. Java Fundamentals, A comprehensive Introduction by Herbert Schildt, Dale Skrien. Tata McGraw Hill Edition 2013.
2. Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007. (Chapter 17)

REFERENCE BOOKS

1. Java 6 Programming, Black Book, KoGenT ,Dreamtech Press, 2012
2. Java 2 Essentials, Cay Hortsmann, second edition, Wiley

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO	PO	PO	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	**2**	**1**	**1**	1	**1**							
CO	**2**	1	**2**	**1**	**1**							
CO		**1**	**2**	**1**	**1**							
CO		1	**2**	**2**	**1**			2		**3**	**3**	
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus – 2024 -2026

Semester	I						
Course Title	**WEB TECHNOLOGIES**						
Course Code	**MCAT12**						
Category	**Professional Core Course(PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- To create web pages using HTML5 and Cascading Style Sheets.
- To build dynamic web pages using Bootstrap & JavaScript.
- To demonstrate structured and unstructured data and handling them.
- To develop different approaches of Server-side scripts using PHP.

UNIT I: Introduction to Web & HTML5 10 hours Introduction to HTML5 tags, Basic syntax and structure, Images, Hyper-links, Lists, Tables, forms. HTML5 elements- Layouts, canvas, media, audio and video, Cascading Style Sheets-Syntax, selectors, Styles-colors, background, text, fonts, icons, links, box model, span and div tags
UNIT II: Bootstrap components 08 hours Introduction to Bootstrap-Bootstrap file structure, Basic HTML Template, Global Styles, Default Grid System – Basic Grid HTML, Offsetting Columns, Nesting Columns, Fluid Grid Systems, Container Layouts. Responsive Design. Bootstrap Layout Components: Dropdown Menus, Forms, Button Groups, Navigation Elements, Navbar, Breadcrumbs, Alerts, Progress Bars, Media Objects
UNIT III: Java Script 08 hours Introduction to Javascript, Screen output and keyboard input, controls statements, Arrays and functions, pattern matching The Document Object Model, DOM-methods, Elements Access in Java Script, Element Access, Events and Event Handling-onclick(), onload(), Java Script validations
UNIT IV: Server-side scripting 08 hours Introduction to 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.
UNIT V: Handling structured and Unstructured data 06 hours

XML- Introduction, syntax, Document structure, Document Type Definitions, Namespaces, XML schema, displaying raw XML documents
Handling structured and unstructured data store: Introduction to JSON, Array literals, Object literals, mixing literals, JSON Syntax, JSON data types, JSON Encoding and Decoding, JSON versus XML.

COURSE OUTCOMES:

CO1: Describe the basic constructs of the web concepts.

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.

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

REFERENCE BOOKS

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

EBOOKS/ONLINE RESOURCES

1. https://www.w3schools.com
2. https://www.tutorialspoint.com

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					1						2	
CO2		2		1	1						3	
CO3		3		2	1		1				1	
CO4					2						1	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of MCA
Scheme and Syllabus - 2024 -2026

Course Title	COMPUTER NETWORKS						
Course Code	MCAT13						
Category	PCC						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Learn the architecture of networks and layers.**
- **Understand the functions of various protocols.**
- **Simulate a network architecture.**

UNIT I: Architecture and Physical Layer **8 hours** Introduction, Uses of Computer Networks, Network Hardware, Network Software: Protocol Hierarchies, Reference Models: The OSI Reference Model, The TCP/IP Reference Model Physical Layer-Digital Modulation, multiplexing, encoding
UNIT II: Data Link Laye **8 hours** Data Link Layer-Data Link Layer Design issues, Error Detection codes, Stop and Wait protocol, Sliding Window Protocols: 1-bit sliding, go-back 'N', Selective repeat, Medium Access Control-The Channel Allocation Problem: Multiple Access Protocols-ALOHA, CSMA - Ethernet
UNIT III: Network Layer **8 hours** The Network Layer- Network Layer Design issues, Routing algorithms- Optimality Principle - Shortest Path Algorithm, Distance Vector Routing, Flooding, Multicast routing protocol
UNIT IV: Internet Protocols and Quality Control **8 hours** Internetworking, IPv4, IPv6, ICMP, ARP, Congestion Control Algorithms, Quality of Service
UNIT V: Network Simulation using NS **8 hours** Introduction to simulator, NAM, Trace file structure, Simulating a TCP network, simulating a UDP network, Simulating a Lan Topology, Transferring a file, Simulating a wireless LAN, Analyzing the network error

COURSE OUTCOMES:

CO1: Understand the architecture of networks and the layering
CO2: Identify the design issues and the significance of various protocols and their services
CO3: Demonstrate the algorithms to improve the quality of network
CO4: Analyze the performance characteristics of a network with a simulator tool

TEXT BOOKS

1. Tanenbaum, A., Computer Networks, 3rd ed., Prentice-Hall, 1996
2. Jan L Harrington, Network Security: A Practical Approach, Morgan Kauffman, 2005

REFERENCE BOOKS

1. Douglas E Comer, “Internetworking with TCP/IP, Principles, Protocols and Architecture” 6thEdition, PHI – 2014, ISBN-10: 0130183806
2. Uyless Black “Computer Networks, Protocols, Standards and Interfaces” 2nd Edition - PHI,ISBN-10: 8120310411.

SCHEME FOR EXAMINATIONS

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

Questions are set covering all the topics under each module

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3									
CO2	2		3							1		
CO3			3							1		
CO4	1		2		3							

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Course Title	**MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS**						
Course Code	**MCAT14**						
Category	**Basic Science Course(BSC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **To understand fundamental concepts of sets, relations, functions, logic, statistics and probability theory**
- **To acquire mathematical concepts like matrix algebra, logic and proofs.**
- **To apply statistical concepts and probability distributions for different real-world problems.**

UNIT I: Matrix Algebra **8 hours** Rank of a matrix-Row Echelon Form and Normal form, Solving system of equations -Gauss Elimination, Eigen values and Eigen vectors, Cayley - Hamilton theorem - Inverse of a matrix
UNIT II: Sets, Relations & Functions **8 hours** Basic definitions, Venn diagrams and set operations, Principle of inclusion and exclusion Relations- Properties of relations, Matrices of relations, Equivalence relations Functions – Injective, subjective and bijective, Function compositions, Pigeon Hole Principle
UNIT III: Mathematical Logic **8 hours** Propositions and logical operators, Truth table, Propositions generated by a set Logical equivalence-converse, inverse and contrapositive, logical implications, Quantifiers, Rules of Inference
UNIT IV: Statistics **8 hours** Descriptive Statistics, Measure of Central Tendency -Mean, Median and Mode, Quartiles, Measure of Dispersion -Range, Median, Absolute deviation about median, Variance and Standard deviation, Skewness and Kurtosis, Correlation-Pearson correlation, Spearman & Kendall Rank correlation.
UNIT V: Probability Distributions and Graph theory **8 hours** Theory of probability-Binomial distribution, Poisson distribution Graphs and Graphs models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, The Konigsberg Bridge problem.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Demonstrate basic concepts of matrix algebra, set theory, functions, relations, graphs, statistics and probability theory used for solving problems.

CO2: Examine the mathematical concepts like Linear algebra, probability distributions, statistics and graph representations for different domains of data science.

CO3: Apply concepts of mathematics, probability, statistics & graph theory concepts to computer applications

CO4: Implement various mathematical concepts gained to analyze the problems arising in practical situations.

TEXT BOOKS

1. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.
2. Theory and Problems of Probability, Seymour Lipschutz and Marc lars Lipson, 2 nd Edition Schaum's Outline Series, ISBN: 0-07-118356-6.
3. Larsen, Richard J., and Morris L. Marx: An Introduction to Mathematical Statistics and its Applications, Pearson Education, 2017.

REFERENCE BOOKS

1. Discrete Mathematics & its Applications, Kenneth H Rosen, 7 th Edition, 2010, McGraw ISBN10: 0073383090, ISBN-13: 978-0-073383095.
2. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Com Science", Tata McGraw Hill, New Delhi, 2007.

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://physicsworld.com/

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2										
CO2	1	2	3									
CO3	3	1	2	2								
CO4	3	2	2	1								
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024-2026

Semester	I						
Course Title	**DATA STRUCTURES AND ALGORITHMS**						
Course Code	**MCAU15**						
Category	**Integrated Professional Core Course(IPCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+24	04
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- Understanding Fundamental Data Structures..
- Analyze data structures and algorithms to solve the problems and evaluate their solutions.
- Demonstrate different Applications of data structures.
- Study the algorithms or program code segments that contains iterative constructs
- Analyze the asymptotic time complexity of the algorithm or code segments.

UNIT I: Introduction to Data Structures and Algorithms **08 hours**

Introduction to stacks, Applications of Stack. Queues, Circular Queue, Linked Lists: Basic Operations, Implementations, Singly Linked List, Linked list implementations of stacks, Example of list operations, Circular Linked List: Inserting, deleting and searching elements in a List, Double Linked List.

UNIT II: Binary Trees **08 hours**

Basic concepts, Binary trees and its properties, operations on Binary Trees, Binary tree Traversals, Binary Search Tree (BST): insertions and deletions operation on BST.

UNIT III: Algorithm Analysis and Algorithmic Paradigms **08hours**

Notion of Algorithms, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms **Divide-and-Conquer:** Merge sort, Quicksort, Binary Search

UNIT IV: Algorithm Design Techniques **08 hours**

The General method, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Warshall's and Floyd's Algorithms.

UNIT V: Graph Algorithms. **08 hours**

The Knapsack Problem, **Decrease-and-Conquer: Depth** First and Breadth First Search, **Backtracking:** n-Queens problem

Lab Component: **2 hours / week per batch**

1. Design a program to perform different operations on STACK of integers.
2. Develop a program to convert an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, %(Remainder), ^ (Power) and alphanumeric operands.
3. Implement the insert and delete operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX).

4. Perform an operation on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Branch, Semester, Mobile number. 5. Design a program to perform different operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo. 6. Perform the following operations on Binary Search Tree (BST) of Integers: Create, traverse and delete operations. 7. Write a program to find the shortest paths in a weighted graph using Floyd-warshall algorithm and compute its time complexity 8. Write a program to find the shortest paths using Dijkstra Algorithm compute its time complexity. 9. Design a program to implement Quick Sort compute its time complexity. 10. Design a program to implement Merge sort compute its time complexity.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation.

COURSE OUTCOMES:

CO1: Demonstrate the implementation of Stack, Queue and List for real world applications.

CO2: Analyze algorithms and solve real time problems using various algorithm design techniques.

CO3: Apply the asymptotic notations to show the performance of the algorithm or code segments.

CO4: Solve the optimization problems by recommending an efficient algorithm.

TEXT BOOKS:

1. Richard F Gilberg and BehrouzAForouzan: Data Structures - A Pseudocode Approach with C,Cengage Learning, 6 the Indian Reprint 2009.
2. Anany Levitin: Introduction to the Design and Analysis of Algorithms, Pearson Education, 2nd Edition

REFERENCE BOOKS:

1. Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenenbaum: Data Structures using C and C++, 2ndEdition, Pearson Education Asia, 2002.
2. NanjeshBennur, Dr.Manjaiaha DH, Dr. C.K. Subbaraya: C programming skills and Data Structures primer, First Edition, IPH Publication, 2017.
3. Coremen T.H., Leiserson C.E., and Rivest R.L.: Introduction to Algorithms, PHI 1998.
4. Horowitz E., Sahani S., Rajasekharan S.: Computer Algorithms, Galgotia Publication 2001.

SCHEME FOR EXAMINATIONS:

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			2							
CO2	3	2										
CO3	3			2	3							
CO4	3	2	2		2							

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Semester	I						
Course Title	**Fundamentals of C Programming**						
Course Code	**MCAU16**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+24	04
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- Provide students with the formal notations for solving a problem and make them learn the syntax of C language, thereby writing code with good programming style.
- Understand and appreciate the use of arrays, strings, functions, structures and Union in C.
- Exploring the pointers and data file processing

UNIT I: Algorithms and Flowcharts **8 hours**

Introduction to Algorithms, Definition of flowcharts, symbol of flowcharts, Algorithms & flow charts using input statements, output statements, compute statements, and conditional statements and iterative statements.

UNIT II: Arrays and Strings **8 hours**

Handling one-dimensional and two-dimensional arrays – dynamic arrays

Handling Strings: String operations and string functions – handling arithmetic operations in strings

UNIT III: User Defined Functions **8 hours**

User defined functions: Elements, Handling function calls – Arrays and Functions

UNIT IV: Structures and Unions **8 hours**

Handling structures - array of structures - structures within structures, structures and functions.

UNIT V: Pointers and File Management **8 hours**

Understanding pointers - chain of pointers - pointers and arrays - pointer and character strings - array of pointers, pointer as functions

Lab Component: **2 hours / week per batch**

1. Write a C program to find the roots of a quadratic equation.
2. Write a C program to generate Fibonacci Series.
3. Write C programs that use both recursive and non-recursive functions i) To find the factorial of a given integer. ii) To find the GCD (greatest common divisor) of two given integers.
4. Write a C program that uses functions to perform the following: i) Addition of Two Matrices ii) Multiplication of Two Matrices.
5. Write a C program to determine if the given string is a palindrome or not.
6. Write a C program which copies one file to another.
7. Write C programs that implements the Selection sort method to sort a given array of integers in ascending order.

8. Write C programs that implements the Bubble sort method to sort a given array of integers in ascending order
9. Write C programs that uses non recursive function to search for a key value in a given list of integers using Linear search
10. Write C programs that uses non recursive function to search for a key value in a given list of integers using Binary search.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Understand the fundaments of programming.
CO2: Develop Problem-Solving Skills
CO3: Design programs using structure and union.
CO4: Design programs using pointers and data file processing

TEXT BOOKS

1. VikasGupta:" Computer Concepts & C Programming", Dreamtech Press 2013. ISBN-13:9788177229981/ISBN-10:8177229982
2. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1st Edition, Pearson 2011.
3. R S Bichkar, Programming with C, University Press, 2012.
4. V Rajaraman: Computer Programming in C, PHI, 2013.

REFERENCE BOOKS

1. Behrouz A Forouzan, Richard F Gilberg: Computer Science-A Structured Approach Using C, 3rd Edition, Cengage Learning,2013
2. M G Venkateshmurthy: Programming Techniques through C, Pearson Education, 2017
3. Ivor Horton: Beginning C from Novice to professional, 7th Edition, Springer, 2014

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1	PO12
CO1	3	2	3		3					1		
CO2	3	3	3	2	3				2			2
CO3	3	3	3	2	3				2			2
CO4		3		2					1			2

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - 2024 -2026

Semester	I						
Course Title	**OBJECT ORIENTED PROGRAMMING USING JAVA LAB**						
Course Code	**MCAL17**						
Category	Professional Core Course Lab (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **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**

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 following system exceptions **ArrayIndexOutOfBound, FileNotFound and NumberFormat Exception.**
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 Datagram Socket for Client Server Communication for multiple systems
TEACHING LEARNING PROCESS: power point presentation, animations, videos	

COURSE OUTCOMES:

CO1: Design and Develop Java programming language and runtime environment and implement the multithreading and client-side programming.

SCHEME FOR EXAMINATIONS

Student has to pick one question from a lot of 12 questions

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	**2**	**1**	**1**	**1**	**1**					**2**	**2**	
Strength of correlation: Low-1, Medium- 2, High-3												

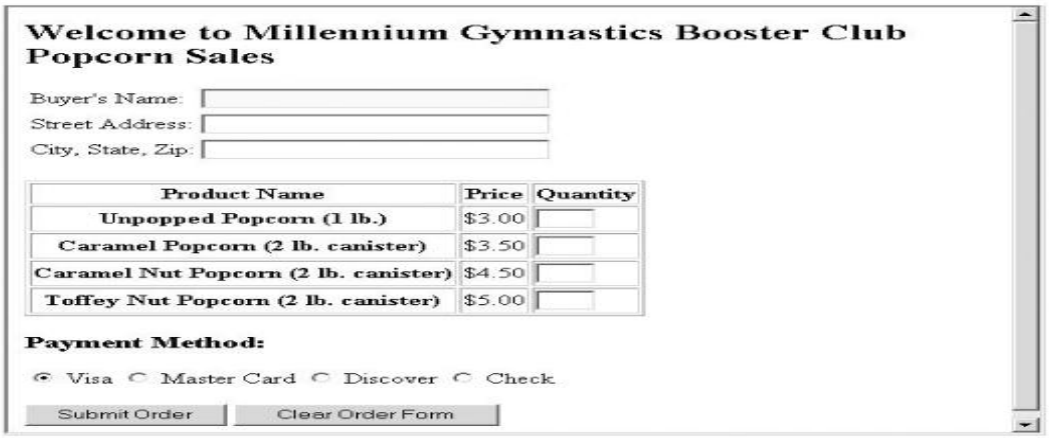
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - 2024 -2026

Semester	I						
Course Title	**WEB TECHNOLOGIES LAB**						
Course Code	**MCAL18**						
Category	Professional Core Course Lab(PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- To design web pages using Bootstrap framework and add effects with jQuery.
- To create web pages using XHTML and Cascading Style Sheets.
- To build dynamic web pages using JavaScript.
- To develop different approaches of Server-side scripts using PHP.
- To design asynchronous web applications using Ajax.

1.	Create an HTML page that provides information about your department. The HTML page must use the following tags: a) Text Formatting tags b) Horizontal rule c) Meta element d) Links e) Images f) Tables g)list h)frames i)
2.	Develop and demonstrate the different types style sheets. Use HTML page that contains at least three paragraphs of text, listed elements and a table with four rows and four columns.
3.	Design a web page using Bootstrap layout components such as Carousel, Cards, Collapse.
4.	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.
5.	Create a HTML 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**

	
4.	Write JavaScript to validate the following fields of the Registration page. First Name (Name should contain alphabets and the length should not be less than 6 characters). Password (Password should not be less than 6 characters' length). E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) Mobile Number (Phone number should contain 10 digits only). Last Name and Address (should not be Empty).
5.	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.
6.	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.
7.	Create a HTML form using Bootstrap with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Provide buttons to update and delete data for the same.
8.	Demonstrate the working of JSON Structures with HTML.

TEACHING LEARNING PROCESS: Power Point presentation, animations, videos

COURSE OUTCOME:

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

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO:1		1		2	2		1				1	
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - 2024 -2026

Course Title	MATHEMATICS BRIDGE COURSE FOR MCA						
Course Code	MCAT19						
Category	Non-Credit Mandatory Course (NCMC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	0
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **To understand fundamental concepts of sets, relations, functions, logic, statistics and probability theory**
- **To acquire basic mathematical concepts like matrix algebra, logic and proofs.**
- **To memorize fundamental statistical concepts and probability distributions.**

UNIT I: Matrices and Determinants **8 hours** Types of Matrices, Algebra of Matrices, Symmetric and Skew Matrices, Properties of Matrices, Elementary row and column operations. Determinant of square matrix(up to 3x3 matrices)-Definition, properties of determinant, minors, cofactors
UNIT II: Sets and Relations **8 hours** Introduction. Representation of sets, Types of Sets, Finite set, Infinite set, equivalent set, disjoint set, Subset, Power set. Venn diagram. Set operations: Union, Intersection, Complement of a set, Difference, Symmetric Difference. Laws of set theory. Cartesian product of sets, Relations and properties.
UNIT III: Sequence and Series **8 hours** Introduction, Sequences, Series, Arithmetic Progression, Sum of Finite number of terms in A.P, Arithmetic Means, Geometric Progression, sum to n terms of G.P, Geometric Mean, relation between A.M and G.M.
UNIT IV: Statistics **8 hours** Descriptive Statistics, Measure of Central Tendency -Mean, Median and Mode, Quartiles, Measure of Dispersion -Range, Median, Absolute deviation about median, Variance and Standard deviation, Skewness and Kurtosis
UNIT V: Probability Theory **8 hours** Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Demonstrate basic concepts of matrix algebra, set theory, relations, statistics and probability theory used for solving problems**.**

CO2: Examine the mathematical concepts like Linear algebra, probability distributions, statistics.
CO3: Determine the sum of the first n terms of an arithmetic and Geometric series.
CO4: Implement various fundamental mathematical concepts find the probability of simple and compound events.

TEXT BOOKS

1. Grimaldi, R.P and Ramana, B.V. "Discrete and Combinatorial Mathematics", 5th Edition, Pearson Education, 2006.
2. Theory and Problems of Probability, Seymour Lipschutz and Marc lars Lipson, 2 nd Edition Schaum's Outline Series, ISBN: 0-07-118356-6.
3. Larsen, Richard J., and Morris L. Marx: An Introduction to Mathematical Statistics and its Applications, Pearson Education, 2017.

REFERENCE BOOKS

1. Discrete Mathematics & its Applications, Kenneth H Rosen, 7 th Edition, 2010, McGraw-Hill, ISBN10: 0073383090, ISBN-13: 978-0-073383095.
2. Trembley, J.P. and Manohar, R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2007.

EBOOKS/ONLINE RESOURCES

1. https://archive.nptel.ac.in/courses/111/105/111105134/
2. https://archive.nptel.ac.in/courses/111/105/111105121/

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M										
CO2	H	M	L									
CO3	L	H	M	M								
CO4	L	M	M	H								
Strength of correlation: Low-1, Medium- 2, High-3												

Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA SECOND SEMESTER 2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignmen	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	PCC	MCAT21	Python Programming	3	-	-	3	50	50	100	3
2	PCC	MCAT22	Software Engineering	3	-	-	3	50	50	100	3
3	PCC	MCAT23	Data Science	3	-	-	3	50	50	100	3
4	IPCC	MCAU24	Database Management System	2	-	2	3	50	50	100	3
5	IPEC	MCAU25x	Elective –1	2	-	2	3	50	50	100	3
6	PEC	MCAT26x	Elective - 2	3	-	-	3	50	50	100	3
7	PCCL	MCAL27	Python Programming Lab	-	-	2	3	50	50	100	1
8	PCCL	MCAL28	Data Science Lab	-	-	2	3	50	50	100	1
9	PBLC	MCAM29	Mini Project-1	-	2	2	3	50	50	100	2
10	NCMC	MCACDN 210	Placement Training	4	-	-	-	-	50	50	PP
11	NCMC	MRMI211	Research Methodology and	Classes and evaluation procedures are as per the policy of the online course providers.							PP
Total				16	02	10	27	450	500	950	22

Note:

PCC : Professional Core Course
PCCL : Professional Core Course Lab
IPEC : Integrated Professional Elective Course
T : Theory
L : Lab
NCMC: Non-Credit Mandatory Course
CDN : Career Development Non-Credit Course

PEC : Professional Elective Course
IPCC : Integrated Professional Core Course
PBCL : Project Based Learning Course
U : Integrated
M : Mini project

MRMI: Research Methodology & IPR

MCA SECOND SEMESTER ELECTIVE COURSES

Elective – 1

S.No	Course Type	Course Code	Course Title
1.	IPEC	MCAU251	Cloud Essentials
2.	IPEC	MCAU252	Big Data Analytics
3.	IPEC	MCAU253	Go Programming

Elective – 2

S.No	Course Type	Course Code	Course Title
1.	PEC	MCAT261	Software Architecture
2.	PEC	MCAT262	Soft Computing
3.	PEC	MCAT263	Software Testing and Automation

Dr. Ambedkar Institute of Technology, Bengaluru-56
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Semester	**II**						
Course Title	**PYTHON PROGRAMMING**						
Course Code	**MCAT21**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	3
CIE Marks: 50	**SEE Marks:50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

- **Understand and learn the basics of Python Programming**
- **Demonstrate the python data structure and database connectivity**
- **Demonstrate data analytics concept using Numpy, pandas and data visualization**
- **Demonstrate database connectivity and object-oriented programming concepts**

UNIT I: Python Basic Concepts and Programming **08 hours**

Introduction to Python programming: Features of Python, Execution of a Python Program, Data types in Python, operators, Control Statements, Functions

UNIT II: Python Data Collections **08 hours**

Strings: Creating and storing strings, string operations, formatting Strings.
Lists: Basic List operations, Built in functions used on lists, List Comprehensions.
Tuples and Sets: Basic Operations on Tuples, Functions to Process Tuples.
Sets: Set Methods, set operations.
Dictionaries: Operations on Dictionaries, Dictionary Methods.

UNIT III: Numpy, Pandas and Data Visualization **08 hours**

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.

UNIT IV: Files and Database Connectivity, Regular Expressions **08 hours**

Files and Database Connectivity: File Processing in python, 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
Regular Expressions: Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files.

UNIT V: Object oriented Programming **08 hours**

Object oriented Programming: Basics of OOPS, Encapsulation, Inheritance, polymorphism. Magic Methods.

Decorators: Understanding Decorators, Decorator Syntax, Decorators Functions, Decorator classes. Context Managers: Context manager syntax, when you should write context managers.

Generators: Understanding Generators, Generator syntax, Generator Examples

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

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.

TEXT BOOKS

1. Core Python Programming: 2017 Edition, R. Nageswara Rao, DreamTech Publication.
2. Python for Data Analysis 2nd Edition, O'Reilly Publications
3. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
4. Core Python Programming, Wesley J Chun, 3rd Edition, Pearson Education.

REFERENCE BOOKS

1. Professional Python, Sneeringer, Luke, 2016, John Wiley & Sons, ISBN -978-1-119-07085-6.
2. Mastering Python Fundamentals with ease, Asha Gowda Kare Gowda, Bhargavi K, Lambart Academic Publishing
3. Introduction to Python Programming, Gourishankar S, Veena A, CRC Press/Tyler and Francies.

SCHEME FOR EXAMINATIONS

Question Paper Pattern:

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2								
CO2	2	3	3	3	1							
CO3	2	2	3	2	1					2	2	
CO4	2	2	3	3	1					3	3	
Strength of correlation: Low-1, Medium- 2, High-3												

Dr. Ambedkar Institute of Technology, Bengaluru-56
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Semester	II						
Course Title	**SOFTWARE ENGINEERING**						
Course Code	**MCAT22**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

- **Classify various software requirement process and tools**
- **Build software Design and Architecture using software notations and tools**
- **Understand, how to implement the software project using software tools and Methodologies**
- **Test the software and measure the quality of Software**

UNIT I: Requirements Engineering **8hours** Software requirements Fundamentals, Requirements process, Requirements elicitation, Requirements Analysis, Requirements specification, Requirements validation, Practical consideration, Requirement tools
UNIT II: Software Architecture and Design **8hours** Software Design Fundamentals, Key Issues in Software Design, Software structure and Architecture, User Interface design, Software design quality analysis and evaluation, Software design notations, Software design strategies and Methods, Software design tools
UNIT III: Software Implementation Methods and Tools **8hours** Software implementation Fundamentals, Managing software Implementation, Practical considerations, software Implementation Tools, software implementation Technologies, Product Documentation, Formal software Implementation methods
UNIT IV: Software Testing and Software Quality **8hours** Software Testing: Software Testing Fundamentals, Test levels, Test Techniques, Test related measures, Test process, testing tools Software Quality: Software Quality fundamentals, Software quality management processes, practical considerations, Software Quality tools
UNIT V: Software Project Management **8hours** Initiation and Scope definition, Software project planning, software project implementation plans, Review and evaluation, software closure activities, software engineering measurement, Software management tools

COURSE OUTCOMES:

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations,

CO1: Understand the importance of Software Engineering and Management, Tools and methodologies

CO2: Design software by using software design notations and design tools

CO3: Implement the software using methods and tools
CO4: Develop the quality Software using efficient project management

TEXT BOOKS

1. Software Engineering, 10th Edition Ian Sommerville , University of St. Andrews, Pearson, 2016

2. Software Engineering: A Practitioner's Approach, 8/e by Bruce R. Maxim and Roger S. Pressman 2019

3. Fundamentals of Software Engineering, Rajib Mall, 4th Edition, PHI, 2014

REFERENCE BOOKS

1. Object oriented software engineering, Stephan R . Schach, Tata McGraw Hill,2008

2. Applying UML and Patterns, Craig Larman, , 3rd edition, Pearson Education, 2005.

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3	2						
CO2					3			2				
CO3					3							2
CO4						2	1		1		3	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
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Semester	II						
Course Title	**DATA SCIENCE**						
Course Code	**MCAT23**						
Category	**Professional Core Course (PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **To understand the concepts of Data science.**
- **To apply the inferential statistics after preprocessing techniques are used.**
- **To implement modelling methods for real world problems.**
- **Analyzing data from files and visualizing graphical presentations using tableau.**

UNIT I: Introduction to Data Science **8 hours** Introduction, Evolution of data science, Applications, Data science process – roles, stages in data science project – components of the Data Science lifecycle, data analytics, Understanding Data and Types of Data, Fundamentals of Big Data- Big Data Definition and Characteristics, Big Data vs. Traditional Data, Big Data Storage Systems
UNIT II: Data Pre-processing and Data Wrangling **8 hours** Data Pre-processing: Data Cleaning, stripping out extraneous information, Find and treat missing values, Identify and treat outliers Data Wrangling: Grouping, merging, combining, concatenating, Reshaping(pivoting), Data Transformation –Mapping
UNIT III: Hypothesis Testing **8 Hours** Inferential Statistics-Measurement scales, Point estimates, Confidence Interval, Central limit theorem, Normalizing data using z-score, Normal Distributions Inferential Statistics-Hypothesis testing: t-test, ANOVA test.
UNIT IV: Data Analytics **8 hours** Understanding Linear regression, making prediction-hypothesis on regression coefficients, Adding best fit. Multiple Linear Regression, Polynomial Regression, Model Evaluation
UNIT V: Data Analytics & Data Visualization **8 hours** Classification- K-Nearest Neighbor Classifier, Bayes Theorem, Naive Bayes Classifier, Model Evaluation-Confusion Matrix Tableau-Introduction, Architecture of Tableau, dimension Vs measure, data types, data filters, Tableau calculations, function used in tableau, Maps, Building a Dashboard.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Outline the role of data science and the significance of exploratory data analysis (EDA) in data science.

CO2: Illustrate data preprocessing techniques and perform statistical analysis using python.

CO3: Apply basic data science algorithms for predictive modelling and analyse using visualization tool.

CO4: Formulate and use appropriate models of data analysis and visualize them.

TEXT BOOKS

1. Joel Grus, Data Science from Scratch, O'Reilly Media, 2015.
2. David Dietrich, Barry Heller," Data Science & Big Data Analytics: Discovering, Analysing, Visualizing and Presenting Data", Wiley,2015
3. Joshua N. Milligan, Blair Hutchinson, Mark Tossell and Roberto Andreoli, Learning Tableau 2022 - Fifth Edition, O'Reilly Media

REFERENCE BOOKS

1. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
2. Ryan Sleeper, Practical Tableau, O'Reilly Media, Inc., Copyright © 2018
3. Communicating Data with Tableau, Ben Jones, O'Reilly Media, Inc.,

EBOOKS/ONLINE RESOURCES

1. https://archive.nptel.ac.in/courses/106/106/106106212/
2. https://www.youtube.com/watch?v=tA42nHmmEKw
3. https://www.youtube.com/watch?v=ua-CiDNNj30

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**										
CO2	**1**	**2**		**3**	**2**							
CO3		**2**		**3**	**3**		**3**			**2**		
CO4	1			**2**	**3**		**3**			**2**	**2**	**2**
Strength of correlation: Low-1, Medium- 2, High-3												

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Semester	**II**						
Course Title	**DATABASE MANAGEMENT**						
Course Code	**MCAU24**						
Category	**Integrated Professional Credit Course (IPCC)**						
Scheme and Credits	**No. of Hours/Week**					**Total teaching hours**	**Credits**
	L	**T**	**P**	**SS**	**Total**		
	02	**00**	**02**	**00**	**05**	**26+26**	**03**
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- Understand and implement the processes of database management system.
- Apply the SQL Query, Database Design
- Interpret RDBMS concept and managing multiple transactions, recovery techniques in case of Transaction failures

UNIT 1: Introduction **6 Hours** Characteristics of Database approach, Actors on the Scene, Workers behind the scene, Advantages of using DBMS approach, Data models, schemas and instances, Three -schema architecture and data independence, Database languages and interfaces, the database system environment
UNIT-2: Entity-Relationship Model **5 Hours** Conceptual Database using high level conceptual data models for Database Design, A Sample Database Application, Entity types, Entity sets Attributes and Keys Relationship types, Relationship Sets, Roles and Structural Constraints Weak Entity Types. Construction of ER diagram: Sample case studies
UNIT 3: Introduction to SQL **5 Hours** Overview of the SQL Query Language, SQL Data Definition, Basic structure of SQL Queries, Additional Basic Operations, Null values, Aggregate Functions, Queries using where, group by, order by
UNIT 4: Working on SQL Queries and normalization **5 hours** Working with subqueries, SQL joins, Complex queries, Handling views – Data control language commands
UNIT 5: Normalization and Transaction Management **5 Hours** Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms based on Primary Keys, General Definitions of 2nd and 3rd Normal Forms, Boyce Codd Normal Forms Transaction Concept, ACID Properties - A Simple Transaction Model, Transaction model states, Serializability

PRACTICAL COMPONENT
List of Laboratory programs (2 hours/week per batch)
Consider the following relational tables: 1. Doctor(docid integer(5), docname varchar(25), specialization varchar(20), experience integer(2), dob varchar(10)) 2. Patient(pid integer(5), pname varchar(25), dob date, date_of_admission date) 3. Staff(staffid integer(5), sname varchar(25), designation varchar(25), date_of_joining date, on_contract boolean default value 0)

4.	Room(roomid integer(5), type varchar(25), AC boolean)
5.	Treated_by(docid, pid, treatment_for varchar(10), consultant_fees integer(4))
6.	Occupied_at(pid, roomid)
7.	Supervising(staffid, roomid)
1.	Demonstrate the DDL commands. • Update the doctor table to change the domain of dob to date. • Add a field 'address' to patient table. • Add a field 'age' to patient table. • Demonstrate deletion of a field in a table. • Demonstrate removal of a table.
2.	Demonstrate the DML commands to • Insert data to the above fields. • Update the contract of all staffs to permanent. • Delete the data of all patients admitted before 2005. • Update the designation of all staffs who had joined after 2020 to Senior_Level_staff. • Update the AC field of all rooms of type "VIP" to value 1.
3.	Apply Querying techniques to fetch data from single table. Sample queries as follows: • Fetch the details of all doctors. • Fetch the age of all patients. • Fetch the details of the doctors and age of all doctors with more than 10 years of experience. • Fetch the details of all staffs who are not permanent. • Find the average experience of doctors specialized in cardiology. • Find the total number of senior level staffs who had joined in the year 2019.
4.	Apply querying techniques to fetch data from multiple tables. Sample queries as follows: • Find the id and name of patients and doctors treating them. • Find the names of patients, doctors and disease treated for. • Fetch the patient details and treatment taken for and fees charged. • Find the patients who are treated by doctor 'Dilip'. • Find the doctors who are treating the patient 'Ranjith'. • Find the patients who are treated by cardiologists. • Find the details of the patients and the rooms they are occupying. • Find the details of the patients occupied in AC rooms. • Fetch the details of the patients who are treated by the doctor with highest experience.
5.	Demonstrate the implementation of joins in SQL. Sample queries as in Q.No.4.
6.	Demonstrate the implementation of views in SQL. Sample queries as in Q.No.4.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Demonstrate on the fundamentals of data models.

CO2: Build ER diagrams and structures for various real-time systems and apply querying techniques.

CO3: Apply normalization techniques in designing databases.

CO4: Implement and analyze the process of transactions to handle multiple transactions.

TEXT BOOKS

1. Elmasri and Navathe: Fundamentals of Database Systems, 5th Edition, Addison -Wesley, 2011
2. Silberschatz, Korth and Sudharshan Data base System Concepts,6th Edition, Tata McGraw Hill, 2011

REFERENCE BOOKS

1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education,2009
2. Raghu Ramakrishnan and Johannes Gehrke: Database management Systems, 3rd Edition McGraw-Hill, 2003

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2	3	3	3	3							
CO3	2	3	3	3	3		H			2	2	
CO4			2		1		1	H		2	2	
Strength of correlation: Low-1, Medium- 2, High-3												

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Semester	**II**						
Course Title	**CLOUD ESSENTIALS.**						
Course Code	**MCAU251**						
Category	**Integrated Professional Elective Course (IPEC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	**00**	**02**	**00**	**04**	**26+24**	**3**
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **Understand the different cloud computing concepts.**
- **To work with virtualized environment.**
- **Explore different cloud services such as Amazon, Salesforce.**
- **Identify different cloud case studies.**
- **Leverage the prominent Cloud computing technologies available in the market place.**

UNIT I: Cloud Computing Overview: **06 hours** Cloud Computing Overview, Definition of Cloud Computing, Characteristics of Cloud Computing Types of Cloud Environments: Public, Private, and Hybrid Cloud. Cloud Service Models: IaaS, PaaS, SaaS, Cloud Deployment Model- Public clouds, Private clouds, Hybrid clouds, Community clouds, Open challenges.
UNIT II: Cloud Architecture and Design: **05 hours** Overview of Cloud Architecture, Components of Cloud Infrastructure: Compute, Storage, Networking, Security, Best Practices in Cloud Architecture, Designing for High Availability and Fault Tolerance Cloud Scalability and Elasticity. Familiarize the services by AWS - Compute services, Storage services, Communication services and Additional services.
UNIT III: Cloud Networking: **05 hours** Key Networking Concepts in the Cloud: VPC, Subnets, Routing, Peering, VPN, Understanding Cloud Load Balancing and Content Delivery Networks (CDN), Public and Private IPs in Cloud Network Security (e.g., Security Groups, Firewalls).
UNIT IV: Cloud Security and Billing: **05 hours** Understanding Shared Responsibility Model in Cloud Security, Cloud Security Principles: Identity & Access Management (IAM), Encryption, Network Security, Regulatory Compliance (e.g., GDPR, HIPAA), Introduction to Cloud Cost Models: Pay-as-you-go, Reserved Instances, Spot Instances Cloud Pricing Calculator and Estimating Costs, Budgeting and Setting up Alerts for Cloud Costs.
UNIT V: **Cloud Case Studies** & **Future of Cloud Computing:** **05 hours** Industry Case Studies of Successful Cloud Adoption- Salesforce-CRM, Emerging Trends in Cloud Computing: Edge Computing, Serverless, AI/ML Integration, The Role of Cloud in Digital Transformation, Cloud-native Applications and Micro services, The Future of Cloud Security and Compliance.
PRACTICAL COMPONENT **List of Laboratory programs (2 hours/week per batch)**
1. Familiarize the services by AWS 2. Creating user login 3. Creating Linux, Windows virtual machines instance using EC2

4. Run simple applications on EC2 Instance
5. Creating Storage using S3.
6. Demonstrate Database application on AWS
7. Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database on Salesforce cloud platform.
8. Create a web application to implement an online cart for adding items to a shopping cart and deleting it.
9. 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.
10. 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.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos
Hands-on Sessions: All the above discussed concepts are demonstrated in the lab.

COURSE OUTCOMES:

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

TEXT BOOKS:

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. Cloud Computing: A Hands-On Approach by Arshdeep Bahga and Vijay Madisetti, 2014.

E-BOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				3					3		
CO2	2		2								2	2
CO3	2		2		3			2			2	2
CO4	2		2								3	3

Strength of correlation: Low-1, Medium- 2, High-3

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Semester	II						
Course Title	BIG DATA ANALYTICS						
Course Code	MCAU252						
Category	Integrated Professional Elective Course (IPEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	26+24	3
CIE Marks: 30+20=50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **To study fundamental concepts about data and its identification**
- **To analyse the design of Hadoop Distributed Files system.**
- **To understand and analyse MapReduce technique for solving BigData problems.**
- **To study different hadoop related tools like Pig, Hive and HBase.**

UNIT I: Introduction to BigData **6 hours**

Introduction, Applications, Basic Nomenclature, Analysis Process Model, Analytical model Requirements, cloud and Big Data –Predictive Analytics, CrowdSourcing Analytics, Inter-and Trans-Firewall Analytics.

Hadoop Fundamentals

Data, Data Storage and Analysis, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.

UNIT II: The Hadoop Distributed File system **5 hours**

The Design of HDFS, HDFS Concepts, Blocks, Name nodes and Data nodes, HDFS Federation, HDFS High-Availability, The Command Line Interface, Basic File system Operations, Hadoop File systems Interfaces, TheJavaInterface, ReadingDatafroma HadoopURL, 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

UNIT III: MapReduce **5 hours**

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

UNIT IV: NOSQL and Hadoop Tool **5 hours**

Introduction to NoSQL, Key-value pair databases, Document databases, Column family databases, 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 –A Filter UDF, An Eval UDF, A Load UDF.

UNIT V: Hadoop Tool-Hive **5 hours**

Hive–Architecture, data types and file formats–HiveQLdatadefinition–HiveQLdatamanipulation–HiveQLqueries.Tables–ManagedTablesandExternalTables, Partitions and Buckets, Storage Formats, Joins, Sub queries, Views. Implementation of case studies.

PRACTICAL COMPONENT List of Laboratory programs (2 hours/week per batch)
1. Hadoop Installation. 2. Installation of VMWare to setup the Hadoop environment and its ecosystems. 3. Implement the following file management tasks in Hadoop: Adding files and directories ii. Retrieving files iii. Deleting files 4. Installation of PIG. Write Pig Latin scripts sort, group, join, project, and filter your data. 5. Installation of HIVE. Use Hive to create, alter, and drop databases, tables, views, functions.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Explain Bigdata Technology and Basic Nomenclature.
CO2: Analyse Hadoop ecosystem and the design of Hadoop Distributed File system.
CO3. Develop and run a MapReduce application
CO4: Recommend Hadoop related tools to perform bigdata analytics.

Text Books:

1. BartBaesens, "Analytics BigData World: The Essential Guide to Data Science and its Applications" Wiley
2. TomWhite, "Hadoop: The Definitive Guide", 3rdEdition, O'Reilly, 2012
3. E.Capriolo, D.Wampler, and J.Rutherglen,"Programming Hive", O'Reilley,2012.
4. AlanGates, "Programming Pig", O'Reilley, 2011
5. ShankarTiwari, Professional NOSQL" O'Reilley

Reference Books:

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

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

LEVEL OF CO-PO MAPPING TABLE												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		**3**										
CO2		**2**	**3**		**2**							
CO3					**2**			**3**		**1**		
CO4					**1**			**2**		**2**	**3**	

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Semester	II						
Course Title	GO Programming						
Course Code	MCAU253						
Category	Integrated Professional Elective Course (IPEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	26+24	3
CIE Marks: 30+20=50	SEE Marks:50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Learn the fundamentals of Go programming language**
- **Understand the handling of various data structures in Go**
- **Apply Go routines and packages to build parallel systems**
- **Design and implement runtime projects**

UNIT I :	**6 Hours**
GO: Getting started – Go Primer: Variables, Functions, Looping E numerations, Structures, Methods, Interfaces, Numbers, Go Error, object-oriented programming concepts	
UNIT II:	**5 Hours**
Generic and Specialized Generic Data Structures, Arrays – Slices – Strings, Collections: Maps, Lists	
UNIT III:	**5 Hours**
Race condition, Mutual Exclusion: sync. Mutex, Read/Write Mutexes: sync. RWMutex. Memory synchronization, Lazy Initialization: sync. Once, The Race Detector Example: Concurrent Non-Blocking Cache, Goroutines and Threads	
UNIT IV:	**5 Hours**
Concurrency with Shared Variables Semaphores and Threads, Reflection and Low-level Programming	
UNIT V:	**5 Hours**
The Go test Tool, Test Functions, Benchmark functions, profiling - Implementation Connecting to servers, Distributing Go, Serving Objects, Calling Remote procedures	

PRACTICAL COMPONENT	
1.	Develop an application using GO Program on Enumeration 2) Interface 3) Methods
2.	Develop an application using GO Program on 1) structures 2) GO error 6) Functions
3.	Demonstrate a Program on Strings 2) Arrays 3) slice 4) Maps
4.	Demonstrate Reflection
5.	Develop an application to demonstrate Goroutines and Channels
6.	Design an application to implement Concurrency
7.	Develop server-side application
8.	Develop concurrent clock server
9.	WAP in Go to create buffered channel, store few values in it and find channel capacity and length. Read values from channel and find modified length of a channel

10.	Write a go program that creates a slice of integers, checks numbers from slice are even or odd and further sent to respective go routines through channel and display values received by go routines.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos	

COURSE OUTCOMES:

CO1: Understand the language features of Go and gain an insight in their implementation
CO2: Analyze the language features for critical design decisions
CO3: Apply Go tools to handle concurrent programming
CO4: Implement Go tools to build applications for massively parallel systems

TEXT BOOKS

1. The GO Programming Language by David Chisnall published by Addision Wesley
2. The GO Programming Language by Alan A. A. Donovan, Brian W. Kernighan published by Addision Wesley

REFERENCE BOOKS

1. An Introduction to Programming in GO by Caleb ISBN: 978-1478355823
2. Learning GO by Miek Gieben

SCHEME FOR EXAMINATIONS

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

COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES												
LEVEL OF CO-PO MAPPING TABLE												
CO/PO	**PO1**	**PO2**	**PO 3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**3**	**2**	**3**	**3**							
CO2	**2**	**3**	**L**	**3**	**3**							
CO3		**3**	**2**	**3**	**3**			**1**				
CO4		**3**	**2**	**3**	**3**			**1**		**1**		

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus – 2024 -2026

Course Title	SOFTWARE ARCHITECTURE						
Course Code	MCAT261						
Category	Professional Elective Course (PEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Designed to understand emerging field of software architecture in software development and the critical need for the development of such architectures.**
- **Develop ability to perform the analyses necessary to formulate effective software architectures.**
- **Analyze Software Engineering problems in terms of architectural thinking.**
- **Apply the architectural concepts of platform, framework, pattern in architecting applications.**

UNIT I: Introduction to software architecture **8 hours** Introduction and Context of Software Architecture. The Architecture Business Cycle. What software architecture is and what it is not; What makes a "good" architecture? What it is and what it is not? Other points of view. Architectural patterns, Reference Models and Reference Architectures. Importance. Architectural structures and views
UNIT II: Quality Attributes **8 hours** Quality attribute scenarios in practice. System quality attributes. Achieving Quality attributes: Availability; Modifiability; Performance; Security; Testability; Usability, Business Qualities
UNIT III: Applying Tactics **8 hours** Applying Tactics: Availability tactics, Interoperability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics
UNIT IV: Architectural Styles **8 hours** Architectural styles: Pipes and Filters, Data Abstraction and OO organization, Event-based, implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control Architectural Patterns - I: From Mud to structure; Layers; Pipes and filters; Blackboard
UNIT V: Applying architectural patterns **8 hours** Architectural Patterns – II: Distributed systems: Broker; Interactive systems: Model-view-control Case Studies: Keyword to context, Instrumentation Software, Mobile Robotics

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: To acquire the knowledge of the context and importance of software architecture and quality maintenance

CO2: To apply the knowledge of various architectural tactics in multiple scenarios to enhance software quality

CO3: To comprehend an architectural style as patterns
CO4: To analyze and apply architectural style in multiple contexts

TEXT BOOKS

1. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice" 3rd Edition ISBN-13: 978-0321815736, ISBN-10: 9780321815736
2. Frank Buschmann, RegineMeunier, et al "Pattern Oriented Software Architecture" 2nd Edition – John Wiley & Sons, ISBN-10: 8120310411

REFERENCE BOOKS

1. Nick Rozanski, Eoin Woods "Software Systems Architecture working with stake holders using viewpoints and perspectives" I edition ISBN-published by Addison Wesley 13: 978-0321112293, ISBN-10: 0321112296

SCHEME FOR EXAMINATIONS

- Each full question consists of 20 marks.

 Questions are set covering all the topics under each module

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**		**3**									
CO2	**1**		**3**					**3**				
CO3	**1**				**3**			**3**				
CO4	**1**		**2**					**3**		**2**		

Dr. Ambedkar Institute of Technology, Bengaluru-56
Master of Computer Applications
Scheme and Syllabus - 2024 -2026

Semester	II						
Course Title	SOFT COMPUTING						
Course Code	MCAT262						
Category	Professional Elective Course (PEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Define and understand important concepts in soft computing**
- **To gain insight onto Fuzzy Logic**
- **To gain knowledge in machine learning through GA (Genetic Algorithm)**
- **Analyze the various soft computing techniques**

UNIT I: Introduction **8 hours** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing, ANN, BNN, First generation NN, perceptron, illustrative problems
UNIT II: Artificial Neural Networks **8 hours** ADALINE, MADALINE, ANN: (2^{nd} generation NN), Introduction, BPN, KNN, HNN, BAM, RBF, SVM and illustrative problems.
UNIT III: Fuzzy Logic **8 hours** Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.
UNIT IV: Genetic Algorithms **8 hours** History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.
UNIT V: Swarm Intelligent System **8 hours** Introduction, Background of SI, Ant Colony System, Working of ACO, Particle Swarm Intelligence (PSO).
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Apprehend soft computing techniques.
CO2: Apply the learned techniques to solve realistic problems
CO3: Differentiate soft computing with hard computing techniques
CO4: Design a fuzzy expert system and apply Genetic Algorithms for various applications

TEXT BOOKS

1. Soft Computing: N.P.Padhy and S.P Simon, Oxford University Press 2015
2. Principles of soft computing: Sivanandam, Deepa S.N, Wiley India, ISBN 13:2011

REFERENCE BOOKS

1. Artificial Intelligence and Expert Systems Development by D W Rolston-Mc Graw hill.
2. Introduction to Neural Networks Using Matlab 6.0: S.N. Sivanandam, S.Sumathi,S.N. Deepa, Tata McGraw-Hill Publishing Company Limited New Delhi

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**3**	**2**					**1**		
CO2		**3**	**3**	**3**	**1**				**2**	**2**		
CO3		**3**		**3**				**2**		**2**		
CO4	**3**	**3**		**3**					**1**			
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of MCA
Scheme and Syllabus - 2024 -2026

Semester	II						
Course Title	SOFTWARE TESTING AND AUTOMATION.						
Course Code	MCAT263						
Category	Professional Elective Course (PEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **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.**

UNIT I: Introduction to Testing: **08 hours**

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.

UNIT II: User Interface Testing: **08 hours**

Fundamentals of Test Automation, Manual Testing Vs Test 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().

UNIT III: Handling Web Elements **08 hours**

CheckBox and Radio Button Operation, Multiple select Operations: DropDown, 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.

UNIT IV: Application Programming Interface (API) Testing: **08 hours**

Client and Server Architecture, Layers of Web Applications, Application Programming Interface(API), web services, Postman Tool- Introduction to Postman, Sending API Requests, Collections, Variables, Scripts. Mock Servers -Introduction to Mock Servers, setting up Mock server, Get Response in Mock Server Postman API- Introduction to Postman API, Continuous Integration Branching and Looping.

UNIT V: Database Testing: **08 hours**

Overviews, Types, Process, stages, Scenarios, Objects, data Integrity, Data Mapping, Tools, Backup, security Recovery, Performance, challenges.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

Hands-on Sessions: All the above discussed concepts are demonstrated in the lab.

COURSE OUTCOMES:

CO1: Analyze the process of Software Testing Life Cycle and types of Testing.

CO2: Demonstrate Manual Testing and Automation in Testing
CO3: Design Test Cases for User Interface Testing.
CO4: Design Test Cases for Application Programming Interface (API) Testing and Data base Testing.

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. 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

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2				3					3		
CO2	2	3	2									
CO3	2	3		3	3			2				
CO4	2	3	2	2							2	2

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of MCA
Scheme and Syllabus - 2024 -26

Semester	II						
Course Title	PYTHON PROGRAMMING LAB						
Course Code	MCAL27						
Category	PCCL						
Scheme andCredits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	-	-	02	00	02	26	1
CIE Marks: 50	SEE Marks:50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- 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** i) Control statements a) Quadratic equation program b) Prime number generation c) Sum the digits d) Evaluate 1/2+2/3+3/4.....n/n+1 e) Count the number of ovels, consonants, numbers, uppercase letters, lowercase letters, numeric characters, white space characters. **ii) Functions** a) calculate the sum of the positive integers of n+(n-2)+(n-4)... (until n-x =< 0). b)Sum of natural numbers c) Lambda functions
2.	Demonstrate string operations i) String functions ii) String reverse without library function iii) Count the number of words in the string
3.	Demonstrate list operations and list comprehension
4.	Demonstrate operations on dictionary i) Simulate language dictionary ii) Phone book modification using dictionary iii) Country capital programming using dictionary
6.	Demonstrate File handling i)count the number of words, characters and lines ii)count the keywords from the source file iv) reverse the contents of the file v) insert the contents in the specified line

	vi) Convert the file contents to upper case vii) read n lines from the beginning and n lines from the end of the file viii) copy the contents from one file to another file
5.	Demonstrate Object oriented Concepts i) Access protection ii) Inheritance iii) overriding iv) Operator overloading
7.	Develop a program to manipulate data using database connectivity.
10.	Data frame manipulation
11.	Develop a program using Numpy
12.	Implement a python program to demonstrate Data visualization with various Types of Graphs

COURSE OUTCOMES:

CO: Design and develop an application using Python Programming for real world scenario.

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with Pos

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO	**3**	**3**	**2**	**3**	**2**			**3**	**3**			

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Semester	II						
Course Title	**DATA SCIENCE LAB**						
Course Code	**MCAL28**						
Category	Professional Core Course Lab (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	01	00	01	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **To apply the inferential statistics after preprocessing techniques are used.**
- **To implement modelling methods for real world problems.**
- **Analyzing data from files and visualizing graphical presentations using tableau.**

List of Laboratory programs (2 hours/week per batch) **10 lab sessions+ 1 repetition class+ 1 Lab Assessment.**	
Python shall be used as an analytical tool to read, preprocess, analyse and visualize the data. **Tableau shall be used for data visualization.**	
1.	a) Demonstrate the working of merge with **inner, outer, left and right join**s in python on a sample dataset. b) Implement Group, Join, replace, concatenate on any given dataset.
2.	Perform one sample t-test and ANOVA test for a given scenario.
3.	Identify Outliers and implement different ways to treat outliers.
4.	Develop Python script to identify and treat missing values on a sample dataset.
5.	a) Formulate linear regression model for any data set and compare the analysis with polynomial regression. b) Implement Multiple Linear Regression and evaluate the model for a sample dataset.
6.	Write a program to implement k-Nearest Neighbour algorithm to classify any given data set. Print both correct and wrong predictions.
7.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8.	Demonstrate different types of charts using Tableau.
9.	Implement aggregate functions in Tableau on a given dataset.
10.	Implement Maps for a real-life scenario.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Illustrate data preprocessing techniques and perform statistical analysis using python.

CO2: Apply basic data science algorithms for predictive modelling and analyse using visualization tool.

SCHEME FOR EXAMINATIONS

- **Student has to pick one question from a lot of given programs**

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2		3	3		3			2		
CO2	1			2	3		3			2	2	2
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of MCA
Scheme and Syllabus - 2024 -26

Course Title	**MINI PROJECT -1**						
Course Code	**MCAM29**						
Category	**PBLC**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	-	02	02	00	04	13+13	2
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Mini project using the following technologies

Mobile application development/ Django frame work

COURSE OBJECTIVES:

- Learn the basics of the Framework
- Build applications using database
- Learn to develop web application/mobile app development

PART - A	
Demonstrate the following concept using Android	
1.	Exploring layouts, widgets
2.	Android activity life cycle
3.	Intents in Android and Shared preferences
4.	Sending SMS and EMAIL
5.	Fragments & Animations
6.	Databases and content providers
7.	Sensors and location-based services
8.	Audio playback and image capture
OR	
Demonstrate the following concept using IOT	
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.

OR	
Demonstrate the following concept using Django Framework	
1.	Django installation and setup environment
2.	Integrating HTML or Bootstrap in Django
3.	Form handling with validation in Django
4.	Develop calculator using Django framework
5.	Django Database connectivity with SQLite or MySQL
6.	Implement Django Admin operations
7.	Django REST API(CRUD operation)
8.	Develop registration page in Django
Note 1: Student has to pick one question from the above list	
PART B- MINI-PROJECT	

Students should be able to build a complete project using multiple features learnt in Part – A with user interfaces and database connectivity and the Project should be deployed .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.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO: Design and develop applications for real world scenarios.

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

LEVEL OF CO-PO MAPPING TABLE											
CO/	**PO1**	**PO2**	**PO**	**PO**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO	**2**	**2**	**3**	**3**	**2**	**3**	**3**		**1**	**2**		

Department of Master of Computer Applications

SCHEME OF TEACHING AND EXAMINATION OF MCA THIRD SEMESTER
2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar/ Assignment	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1	IPCC	MCAU31	Machine Learning and Deep Learning	3	-	2	3	50	50	100	4
2	IPCC	MCAU32	Full Stack Web Development	3	-	2	3	50	50	100	4
3	PEC	MCAT33x	Professional Elective Course-1	3	-	-	3	50	50	100	3
4	PEC	MCAT34x	Professional Elective Course-2	3	-	-	3	50	50	100	3
5	PBLC	MCAM35	Mini Project-2	-	-	4	3	50	50	100	2
6	INT	MCAI37	Industry Internship	-	-	-	-	50	50	100	4
Total				9	-	10	12	300	300	600	20

Note:

PBLC : Project Based Learning Course
INT : Internship
IPEC : Integrated Professional Elective Course
SDC : Skill Development Course

Department of Master of Computer Applications

MCA THIRD SEMESTER PROFESSIONAL ELECTIVE COURSES

Professional Elective Course-1

S.No	Course Type	Course Code	Course Title
1.	PEC	MCAT331	Next Gen Databases
2.	PEC	MCAT332	Artificial Intelligence
3.	PEC	MCAT333	Generative AI and its Applications
4.	PEC	MCAT334	Advanced Operating Systems

Professional Elective Course-2

S.No	Course Type	Course Code	Course Title
1.	PEC	MCAT341	Linux and Shell Programming
2.	PEC	MCAT342	Project Management with Scrum and git
3.	PEC	MCAT343	Web Marketing and Analytics
4.	PEC	MCAT334	Cyber Security

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2024 -2026

Semester	III						
Course Title	MACHINE LEARNING AND DEEP LEARNING						
Course Code	MCAU31						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **To distinguish between, supervised & unsupervised and gain knowledge about basic concepts of Machine Learning.**
- **To understand concept learning and apply machine learning techniques and analyze text using NLP.**
- **To apply the appropriate machine learning strategy for any given problem.**
- **To develop skills of using recent machine learning software for solving practical problems.**

UNIT I: Concept Learning and Supervised Learning **8 hours** Concept Learning-Find S algorithm, Candidate Elimination Algorithm. Supervised Learning: Decision Tree- ID3 classifier, Overfitting and Under fitting Ensemble Methods-Bagging & Boosting, Random Forest Model
UNIT II: Unsupervised Learning & Reinforcement Learning **8 hours** Introduction to Unsupervised Learning, Clustering- different types of clustering techniques-Partitioning methods, Hierarchical clustering, Density based Methods. Reinforcement Learning-Introduction, Markov's Decision Process
UNIT III: Deep Neural Network **8 hours** Foundations of Neural Networks and Deep Learning: Neural Networks- Biological neuron, Perceptron, Multilayer feed forward networks, Training neural networks, Activation functions, Loss functions, and hyper parameters. Convolution neural networks-CNN architecture, layers, pooling layers, fully connected layers, applications of CNN, Recurrent neural networks
UNIT IV: Introduction to Natural Language Processing **8 Hours** Introduction to NLP, History of NLP, Text Analytics and NLP, various steps of NLP, Types of data Preprocessing in NLP-Removing punctuation, removing stop words, Tokenization, Stemming, Lemmatization, creating a world cloud Feature extraction from texts- Feature extraction methods -Bag of Words (BOG)
UNIT V: Generative AI **8 Hours** **Definition and key concepts,** Types of Generative Models: Autoregressive Models (e.g., GPT), Variational Autoencoders (VAEs), Generative Adversarial Networks (GANs), Applications of Gen AI – Text, Image, Code Generation, Audio/Video synthesis.

Prompt Engineering – Definition and Importance, Role of prompts in guiding AI behaviour. Types of Prompts – Zero- shot, few-shot and chain of thought programming, Instruction-based prompts Vs open-ended prompts.	
PRACTICAL COMPONENT	
List of Laboratory programs (2 hours/week per batch) 10 lab sessions+ 1 repetition class+ 1 Lab Assessment.	
Knowledge of Data preprocessing and applying graphs using python to the datasets is a prerequisite to implement Machine Learning and Deep Learning algorithms.	
Demonstrate different ways of preprocess the data. Apply data cleaning techniques and treat them on sample dataset.	
1.	Implement FIND S Algorithm using python to get Maximally Specific Hypothesis.
2.	Demonstrate the working of the decision tree using Sklearn package. or Demonstrate the working of Random Forest for a given dataset.
3.	Implement K-Means clustering technique for a given data set in python. Implement hierarchical clustering and visualize dendrograms.
4.	Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5.	Implement Perceptron using sklearn package.
6.	Implement Convolutional Neural Network to predict hand written digits.
7.	Implement text pre-processing techniques using python's natural language processing toolkit.
8.	Develop a python script to implement TF-IDF on a given paragraph.
9.	Construct Word Cloud for bag of words in python.
10.	Python program to simulate a resume screening system using basic Natural Language Processing (NLP) techniques such as keyword matching, scoring, and ranking.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Explain basic concepts related to Machine Learning and deep learning techniques.

CO2: Identify appropriate techniques to process the data and analyze text extraction using NLP.

CO3: Apply suitable techniques of machine learning and perform Model evaluation.

CO4: Implement machine learning and deep learning algorithms to solve real-world problems.

TEXT BOOKS

1. Machine Learning, Tom M Mitchel, McGraw Hill publications, ISBN-0070428077
2. Principles of Soft Computing, Dr. S. N. Sivanandam, Dr. S. N Deepa, Weilly India, 2nd Edition, 2011.
3. Natural Language Processing Fundamentals, By Sohom Ghosh, Dwight Gunning, PACKT publisher, 2019

4. Josh Patterson and Adam Gibson, Deep Learning, A practitioner's approach, First edition, Shroff Publishers and Distributors Pvt. Ltd., 2017

REFERENCE BOOKS

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

EBOOKS/ONLINE RESOURCES

1. https://onlinecourses.nptel.ac.in/noc23_cs18/preview
2. https://onlinecourses.nptel.ac.in/noc23_ee87/preview

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										2
CO2	1	2		3				2				
CO3	1	1		3	3			2		3	2	1
CO4	1	1		3	3			2		3	2	1
Strength of correlation: Low-1, Medium- 2, High-3												

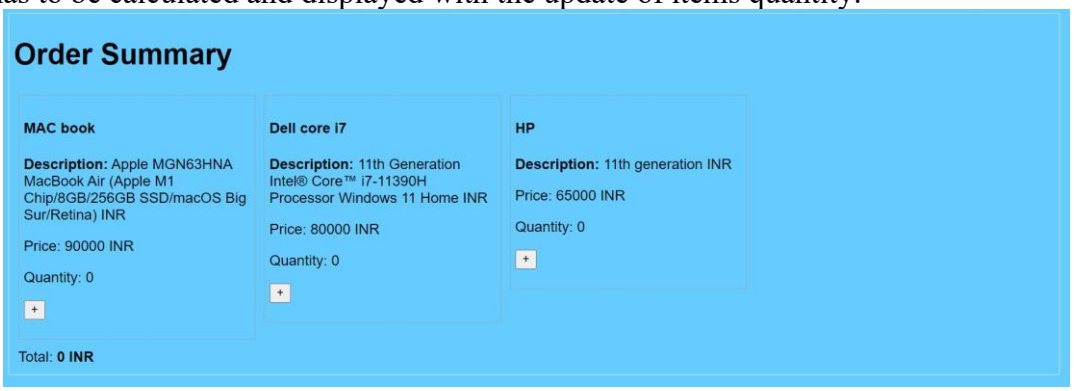
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - 2024 -2026

Semester	**III**						
Course Title	**FULL STACK WEB DEVELOPMENT**						
Course Code	**MCAU32**						
Category	**IPCC**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	5	40+26	04
CIE Marks: 30+20	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

- **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.**

Unit 1: **Introduction to React** **8 Hours** 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
Unit 2: React Components and Redux **8 Hours** React Props, React state-setting state, Event handling, Designing components-state vs props
Unit 3: Programming in Node.js **8 Hours** 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
Unit 4: Expressing REST APIs **8 Hours** REST-HTTP Methods as actions, Express-Routing, Handler Functions, The List API-automatic Server Restart, testing, Create API, Error Handling.
Unit 5: Working with MongoDB **8 Hours** 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. Inserting, removing, and updating the documents. Scheme Initialization, Reading and writing to Mongodb.
PRACTICAL COMPONENT
List of Laboratory programs (2 hours/week per batch) **10 lab sessions+ 1 repetition class+ 1 Lab Assessment.**
Practical Programs on ReactJS, NodeJS and MongoDB, Database Connectivity

1.	a) Design a React program to perform a toggle operation on a click of a button using props. b) Develop a reactJs Application which demonstrate the working of Class component to display Employee details like Sname , Sid, Dept, Age, Apply inline CSS styling for the same
2.	a) Develop a program to print the textbox value on an alert box using States. **b)** Develop a program to handle user events
3.	Create and display an order detail list for any 3 items which will include the product name, product description, price and quantity. When an onClick event istriggered on a button the quantity has to increase and the total cost along with Order date and Expected delivery Date, has to be calculated and displayed with the update of items quantity.  Order Date: 05/10/2022 (Note - Current date in dd/mm/yyyy) Expected Delivery Date: 08/10/2022 (Note - Current Date + 3 days)
4.	Build a basic registration form in React where users can enter first name, last name, and email. Post-registration, an error message is displayed for each field if validation fails else a success message is shown.
5.	a) Create a Node.js file that reads the requested file and returns the content to the client using routers. If anything goes wrong, throw a 404 error b) Implement file operations using NodeJS file system Module.
6.	Build a REST application for Library Management using NodeJS & Express JS.
7.	Perform CRUD operations with NodeJS with MongoDB.
8.	Create Login credentials using ReactJS,NodeJS. Upon successful login display message “Login Success” otherwise display message “Login Failed” Using MongoDB
9.	Create a NodeJS application to insert and display details of a person using HTML, Express framework and MongoDB.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Explain basic concepts related to Machine Learning and deep learning techniques.

CO2: Identify appropriate techniques to process the data and analyse text extraction using NLP.

CO3: Apply suitable techniques of machine learning and perform Model evaluation.

CO4: Implement machine learning and deep learning algorithms to solve real-world problems.

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

LEVEL OF CO-PO MAPPING TABLE												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1					**3**						**2**	
CO2		**2**		**3**	**3**						**3**	
CO3		**3**		**2**	**3**		**3**				**3**	
CO4					**2**						**3**	

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2024 -2026

Semester	**III**						
Course Title	**INTERNET OF THINGS**						
Course Code	**MCAU331**						
Category	Integrated Professional Elective Course (IPEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- 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	**8 Hours**
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	**8 Hours**
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	**8 Hours**
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	**8 Hours**
Introduction,OSI and TCP/IP communication model for communication network.DataProtocol:MQTT,CoAP,AMQP,XMPP,WebSocket. **CommunicationProtocols:**Introduction toIEEE802.15.4,Zigbee,6LowPan, Wireless HART,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	**8 Hours**
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. **IoT platforms:**AWS IoT, Microsoft Azure IoT,IBM Watson, Cisco's IoT,SalesForce's IoT,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**

Text Books

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 Arshdeep Bahga and Vijay Madisetti (Hands-on-Approach)", 1stEdition, VPT, 2014. (ISBN: 978-8173719547).

Reference Books

1. Jan Holler, Vlasios Tsiatsis, 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.
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.

LEVEL OF CO-PO MAPPING TABLE

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

CO1	**3**				**2**					**3**		
CO2		**3**	**2**	**2**	**3**			**1**				
CO3		**3**	**2**	**3**						**L**		
CO4		**3**	**3**	**3**	**3**			**2**			**3**	**3**

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2024 -2026

Semester	III						
Course Title	ARTIFICIAL INTELLIGENCE						
Course Code	MCAU332						
Category	Integrated Professional Elective Course (IPEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

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

UNIT I: Introduction **8 hours** Introduction to artificial intelligence, AI Agents and environment, typs of agents, structure of intelligent agent , History of AI AI applications, PEAS, Problems, Problem solving, Problem solving agents.
UNIT II: Knowledge Representation **8 hours** Issues of knowledge representations, Types of knowledge, Mappings Approaches to knowledge representations, knowledge using Rules, search Knowledge, rationality, heuristic search strategies, Search, Adversarial search, Planning and scheduling
UNIT III: Symbolic Reasoning **8 hours** Under Uncertainty, Statistical reasoning, Logical agents, The wumpus worldproblem, Weak Slot and Filter Structures, strong slot-and-fillerstructures, Game Playing.
UNIT IV: Fuzzy Logic and inference **8 hours** Ontologies Bayesian reasoning Temporal reasoning, Bays theorem, types of learning, decision trees, Case study: Medical diagnosis.
UNIT V: Natural Language Processing **8 Hours** Introduction to Natural Language Processing Learning techniques, Expert Systems, Case studies: Playing chess, Manufacturing scheduling.

PRACTICAL COMPONENT	
	List of Laboratory programs (2 hours/week per batch) **10 lab sessions+ 1 repetition class+ 1 Lab Assessment.**
1.	Implement basic search strategies 8-Puzzle Problem
2.	Implement basic search strategies – 8-Queens Problem
3.	Implement basic search strategies – Crypt arithmetic
4.	Implement A* Algorithm
5.	Implement Mini-Max algorithm for game playing
6.	Solve constraint satisfaction problems
7.	Propositional Model Checking Algorithms

8.	Implement Forward Chaining Algorithm
9.	Implement backward Chaining Algorithm

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Identify the AI based problems

CO2: Apply techniques to solve the AI problems

CO3: Explain various learning techniques

CO4: Implement AI concepts in real time projects

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 2ndEdition.
3.	Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hall 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

EBOOKS/ONLINE RESOURCES

1. https://www.nptel.ac.in

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2										2
CO2	1	2		2				2				
CO3	1	1		3	3			2		3	2	1
CO4	1	1		3	3			1		3	2	1
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Semester	**III**						
Course Title	**WEB MARKETING AND ANALYTICS**						
Course Code	**MCAU334**						
Category	IPEC						
Scheme and Credits	No. of Hours/Week					Total teaching hours	**Credits**
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- Demonstrate the key concepts related to e-marketing for the given case.
- Identify the importance of the digital marketing for marketing success, to manage customer relationships across all digital channels.
- Able to do Web site and SEO optimization and to develop a digital marketing plan.
- Analyze role of social media marketing for the given problem.

UNIT I : Introduction to Digital Marketing **8 hours**

Introduction: Introduction to digital marketing, Digital marketing platforms and Strategies , Latest Digital marketing trends ,Emergence of digital marketing as a tool, Drivers of the new marketing environment; P.O.E.M. framework, Digital landscape, Digital marketing plan, Digital marketing models.

Web design: Optimization of Web sites, MS Expression Web.

UNIT II: Internet Marketing and Digital Marketing Mix **8 hours**

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

UNIT III: Social Media Marketing **8 hours**

Social Media Marketing – Role of Influencer Marketing, Tools & Plan– Introduction to social media platforms, penetration & characteristics;

Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools

Linkedin Marketing: - Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin

Twitter Marketing: - Introduction to Twitter Marketing, Twitter Advertising Campaigns Instagram and Snapchat: - Digital Marketing Strategies through Instagram and Snapchat

Mobile Marketing: - Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics.

UNIT IV: Search Engine Optimization (SEO) & Analytics: 8 hours

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising– - Introduction and need for SEO, to use internet & search engines; search engine and its working pattern, On-page and off-page optimization, SEO Tactics - Introduction to SEM Web Analytics: - Google Analytics & Google AdWords; data collection for web analytics, multichannel attribution, Universal analytics, Tracking code Trends in digital advertising

Customize Client-Specific Messaging - Utilise ChatGPT to assist in the creation of unique content in building a web presence; Enhance Social Media Strategy - Customise messages for different client categories to enhance marketing effectiveness to expand audience reach and engagement.

UNIT V: Web Analytics 8 hours

Web analytics: Web analytics – levels, Importance of Analytics for Business, Popular Analytics Software's, Key performance Metrics [KPI] in Analytics Visits and Users, Time on Page, Bounce Rate, Exit Rate, Conversion Rate Engagement.

Conversion Tracking: What is conversion, Conversion Process and Funnel, Types of Conversions, Conversion Reports, Funnel Visualization, Multi-Channel Funnels, Attribution Reporting, Digital Marketing Budgeting.

Behavior Analysis -Introduction to Behavior Analysis; Collecting quantitative data; Understanding website traffic and user behavior; traffic sources, page views, referring sites, and website conversion rates; Segmenting audiences;

Practical Component

List of Laboratory programs (2 hours/week per batch)
10 lab sessions+ 1 repetition class+ 1 Lab Assessment.

Tools such as **: Google Analytics 4, Google Search Console, Google Tag Manager, Page Speed Insights, Facebook Ads, OpenAI ChatGPT, YouTube, Mailchimp** can be used for practical demonstration.

1.	Use any digital marketing tool to find relevant keywords for a given website or topic.
2.	Perform keyword research and analyze keyword performance using SEO tools.
3.	Optimize on-page elements like title tags, meta descriptions, and headers.
4.	Set up and navigate Google Analytics to understand website traffic and user behavior.
5.	Optimize a webpage for search engines using on-page SEO techniques.
6.	Create and manage a Pay-Per-Click(PPC) advertising campaign using Google Ads. Write ad copy for the campaign, including headlines and descriptions
7.	Create and publish engaging blog content.
8.	Design and optimize a landing page for a specific campaign.
9.	Analyze the performance of social media campaigns using analytics tools. Launch the campaign and monitor its performance.
10.	Demonstrate the improvement of conversion rate of a website or landing page.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Demonstrate a comprehensive understanding of digital marketing concepts, strategies, and best practices.

CO2: **Apply search engine optimization (SEO) best practices to enhance website visibility, increase organic traffic, and improve search engine rankings.**

CO3: **Evaluate the performance of emerging trends in Digital Marketing and web analytics.**

CO4: **Analyse economic aspects of E-marketing, online advertising and marketing strategies to solve business problems.**

TEXT BOOKS

1. Seema Gupta "Digital Marketing" Mc-Graw Hill 1st Edition – 2017.
2. Puneet Singh Bhatia "Fundamentals of Digital Marketing" Pearson 1st Edition – 2017.

REFERENCE BOOKS

1. Ian Dodson "The Art of Digital Marketing" Wiley Latest Edition
2. Prof. Nitin C. Kamat, Mr. Chinmay Nitin Kamat Digital Social Media Marketing.

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										
CO2	2	3				2					1	
CO3	2	3	1								2	2
CO4	2	1	1		3	2				3	2	3
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus – 2024 -2026

Semester	**III**						
Course Title	**Operating Systems and Linux System Programming**						
Course Code	**MCAU341**						
Category	**Integrated Professional Elective Course (IPEC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	4
CIE Marks: 50	**SEE Marks:50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- Understand the concept of OS and different types of OS.
- Understand the techniques for management of different resources.
- Understand the UNIX Architecture, File systems and use of basic Commands.
- Understand and analyze UNIX System calls, Process Creation, Control & Relationship.

UNIT I: Introduction 8 Hours

Defining operating system, History and Evolution of operating system, Basic Concepts: batch processing, spooling, multiprogramming, multiprocessor system, time-sharing, real-time systems, Functions and Goals of operating system

UNIT II: Process Management 8 Hours

Process concept, Process Control Block, Process State: State Transition Diagram, Scheduling Queues: Queuing Diagram, Types of schedulers-context switching and dispatcher, various types of CPU scheduling algorithms and their evaluation, multilevel queues, and multilevel feedback queues

UNIT III: Introduction to UNIX: 8 Hours

Unix Architecture, Features of UNIX, General purpose utility commands, Basic and advanced file attributes, File system. Introduction to version control system: git and its usage for managing code repositories. Introduction to Shell Script: Shell scripts, read, command line arguments, exit, variables, wildcards, escape characters logical operators and conditional operators

UNIT IV: Programming through Shell Script: 8 Hours

if conditional, case conditional, expr computations and string handling, while looping, for looping, set and shift, trap interrupting a program, debugging shell scripts with set command, validation and data entry scripts, function: introduction, scope of variable

Scripting Standards: Scripts and naming convention, Script File Permission, Shell Script Format, Sequence of Script execution

UNIT V: Introduction to filters: 8 Hours

pr: paginating files, head: Displaying the beginning of a file, tail: displaying the end of the file, cut: slitting a file vertically, paste: pasting files, sort: ordering a file, uniq, tr: translating characters. Filters and regular expression: grep: Searching for a pattern, Basic Regular Expression, Extended Regular Expression and egrep, types of grep. sed: stream editor, Line addressing, Context addressing, Text

editing, Substitution. awk: Simple awk filtering, splitting a line into fields, printf, redirecting and expression, comparison, begin and end, built-in variables and arrays

PRACTICAL COMPONENT
List of Laboratory programs (2 hours/week per batch)
1.Write a shell script that takes a valid directory name as an argument and recursively descend all the subdirectories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output 2. Write a shell script that accepts two file names as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions and otherwise output each file name followed by its permissions 3. Create a script file called file-properties that reads a file name entered and outputs it properties 4. Write a shell script which accepts valid log-in names as arguments and prints their corresponding home directories, if no arguments are specified, print a suitable error message. 5. Write a shell script that accepts a path name and creates all the components in that path name as directories. For example, if the script is named mpc, then the command mpc a/b/c/d should create directories a, a/b, a/b/c, a/b/c/d. 6. Write a shell script that accept one or more filenames as argument and convert all of them to uppercase, provided they exist in current directory 7. Write a shell script that displays all the links to a file specified as the first argument to the script. The second argument, which is optional, can be used to specify in which the search is to begin. If this second argument is not present, the search is to begin in current working directory. In either case, the starting directory as well as all its subdirectories at all levels must be searched. The script need not include any error checking. 8. Write a shell script to display the calendar for current month with current date replaced by * or ** depending on whether the date has one digit or two digits. 9. Write a shell script that accepts filenames as arguments and displays its creation time if the file exists and if the file does not exists, send output error message. 10. Write a shell script that accepts the file name, starting and ending line number as an argument and display all the lines between the given line number.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos
Hands-on Sessions: All the above discussed concepts are demonstrated in the lab.

COURSE OUTCOMES:

CO1: Demonstrate need for OS and different types of OS
CO2: Apply suitable techniques for management of different resources
CO3: Understand File system and Demonstrate commands to extract, interpret data for further processing.
CO4: Analyze the usage of different shell commands, variables and AWK filtering

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006

2. Sumitabha Das, Unix Concepts and Applications, McGraw Hill, 4th Edition, 2012, ISBN:978-0-07-063546-3
3. Ganesh Naik, Learning Linux Shell Scripting, Packt Publishing, 2nd Edition, May 2018, ISBN:978-1788993197
4. Mokhtar Ebrahim, Andrew Mallett, Mastering Linux shell scripting, Packt Publishing, 2nd Edition, 2018, ISBN 9781788990554

REFERENCE BOOKS

1. Imran Afzal, A Complete Course on Linux bash shell scripting with real life examples, Packt Publishing, July 2019, ISBN:9781838984083.

EBOOKS/ONLINE RESOURCES

1. https://www.packtpub.com/in/cloud-networking

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**										
CO2	**1**	**2**		**3**	**2**							
CO3		**2**		**3**	**3**		**3**			**2**		
CO4	1			**2**	**3**		**3**			**2**	**2**	**2**
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2024 -2026

Semester	**III**						
Course Title	**PROJECT MANAGEMENT WITH SCRUM AND GIT**						
Course Code	**MCAU331**						
Category	**IPEC**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

- Understand the principles of Agile and Scrum methodology.
- Apply Scrum roles, artifacts, and events in software projects.
- Use version control systems effectively, especially Git.
- Collaborate using tools like GitHub, Git Lab, or Bit bucket.
- Integrate Scrum and version control in real-life project scenarios.

UNIT I: Introduction to Agile and Scrum **8 hours**

Software development methodologies overview: Waterfall vs. Agile. Agile Manifesto: Principles and values. Introduction to Scrum framework. Roles: Product Owner, Scrum Master, Development Team. Events: Sprint, Daily Scrum, Sprint Planning, Sprint Review, Sprint Retrospective. Artifacts: Product Backlog, Sprint Backlog, Increment. Scrum vs. other Agile frameworks (Kanban, XP).

UNIT II: Scrum in Practice **8 hours**

Writing effective User Stories and Acceptance Criteria. Product Backlog grooming. Estimation technique:Planning Poker, Story Points. Sprint Planning and Sprint Execution. Burn-down charts and Scrum boards (Jira, Trello, etc.) Case Study: Simulated Sprint.

UNIT III: Introduction to Version Control **8 hours**

What is version control? Importance in collaborative development. Types of VCS: Centralized vs. Distributed. Introduction to Git: History, installation, configuration. Basic Git commands: init, clone, add, commit, status, log.

UNIT IV: Branching and Collaboration with Git **8 hours**

Branching model: main, feature, release, hotfix. Merging and resolving conflicts. Working with remote repositories. GitHub/GitLab essentials: Forking, Pull Requests, Issues, Wikis. Collaboration best practices (commit messages, pull request etiquette).

UNIT V: Integrating Scrum and Git **8 hours**

Structuring Scrum projects using Git. Mapping sprints to branches. Continuous integration basics (GitHub Actions, GitLab CI). Sample team project: End-to-end workflow

PRACTICAL COMPONENT

List of Laboratory programs (2 hours/week per batch)

1. Demonstration of Agile tool: The students are expected to learn any of the popular agile tool.
2. Student teams, consisting of 2 to 4 members, are required to design either a **College Fest App** or a **Campus Networking Web App (Connect)**. They will apply the **Scrum methodology** to manage the project in a real-world scenario. The teams must use **Git and GitHub** for collaboration and version control, and utilize **Jira** to manage tasks and workflows. Through this project, students

will gain hands-on experience with **agile tools and practices** that support effective teamwork and continuous delivery.
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Understanding the fundamental concepts of Agile and Scrum methodology.
CO2: Apply Scrum roles, artifacts, and events in software projects
CO3: Analyze Git branching strategies in team-based development.
CO4: Evaluate the effectiveness of a Git workflow.

TEXT BOOKS:

1. Jeff SutherlandJeff Sutherland: Scrum: The Art of Doing Twice the Work in Half the Time – Jeff Sutherland, ISBN-13 978-1847941084.
2. Jon Loeliger, Matthew McCullough: Version Control with Git

REFERENCE BOOKS:

1. Career Transition to Scrum Master - Practical Insights. -
2. Atlassian Agile Coach
3. Git documentation (git-scm.com)
4. GitHub Learning Lab

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	3	3	1	3				
CO2	2	2	2	2	3	3	1	3				
CO3	2	2	2	2	3	3	1	3		1	3	
CO4	2	2	2	2	3	3	1	3			3	3
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2022 -2024

Course Title	**DEVOPS**						
Course Code	**MCAU343**						
Category	**IPEC**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 50 30+20=50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

- **Learn the Docker fundamentals, Virtual Machine.**
- **Understand the working of containers.**
- **Learning the fundamentals of migrating applications across environments with continuous integration and delivery.**
- **Explore the Kubernetes and its functionalities.**

UNIT I: Docker Fundamentals: 08 hours Discovering Docker, What and why of Docker, Building a Docker application. Understanding Docker - Docker's architecture, The Docker daemon, The Docker client, Docker registries, The Docker Hub
UNIT II: Docker as Virtual Machine: 08 hours Using Docker as a lightweight virtual machine - From VM to container, Saving and restoring your work, Environments as processes, building images, Running containers
UNIT III: Docker and DevOps: 08 hours Continuous integration - Docker Hub automated builds, Containerizing your CI process. Continuous delivery - Interacting with other teams in the CD pipeline.
UNIT IV: First steps with Docker and Kubernetes: 08 hours Creating, running, and sharing a container image, setting up a Kubernetes cluster, Running the first app on Kubernetes
UNIT V: Pods: 08 hours Introducing Pods, creating pods from YAML or JSON descriptors, organizing pods with labels, Listing subsets of pods through label selectors, Annotating pods, Using namespaces to group resources, Stopping and removing pods
Lab Session: 2 hours / week per batch 1. Setting up and demonstration of Kubernetes clusters and basic kubectl commands. 2. Creating simple Pod YAML files, configuration, view and deployment. 3. Demonstration on Scaling and updating the Applications. 4. Designing a code for Monitoring and Logging. 5. Create a simple web application using Docker. 6. Create an application that uses multiple services. 7. Implement a basic CI/CD pipeline using Docker. 8. Deploy a simple web application on a Kubernetes clusters 9. Demonstrate Kubernetes with Persistent Storage 10. Implement auto-scalling and monitoring for a Kubernetes applications.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Understand of Docker basics, installation and learn to work with containers

CO2: Use containers and move applications across environments with continuous integration and Delivery.

CO3: Leverage Docker to perform automated builds and make Kubernetes to work on container. images

CO4: Explore the Kubernetes architecture to set up and use entire lifecycle-based clusters and pods

TEXT BOOKS

1. Ian Miell, Aidan Hobson Sayers, "Docker in Practice", Manning Publications, 2nd Edition, 2019, ISBN–9781617294808.

2. Marko Lukša, "Kubernetes in Action", Manning Publications, 2nd Edition, 2018, ISBN–9781617293726.

REFERENCE BOOKS

1. James Turnbull, "The Docker Book", Turnbull Press, 2nd Edition, 2017, ISBN–9780988820203
2. Brendan Burns, Joe Beda, and Kelsey Hightower, “Kubernetes: Up and Running”, 2nd Edition, 2019, ISBN–978-1-492-04653

SCHEME FOR EXAMINATIONS

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

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1				1					1	1	
CO2		1	2	2	1			3				
CO3		1	2	1						2		
CO4	3		1		1			2			1	1
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
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Scheme and Syllabus - CBCS – 2024 -2026

Semester	III						
Course Title	CYBER SECURITY						
Course Code	MCAU344						
Category	IPEC						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	40+26	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

- To prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.
- To develop graduates that can identify, Analyse.
- Remediate computer security breaches.

MODULES	TEACHING HOURS
MODULE 1: Introduction, Cybercrime	**8 Hours**
Definition and Origins of the word, Cyber crime and information Security, Who are Cybercriminals? Classifications of Cybercrimes. How Criminals Plan Them – Introduction, How Criminals Plan the Attacks, Cyber cafe and Cybercrimes, Botnets, Attack Vector, The Indian IT ACT 2000.	
MODULE 2: Tools and Methods used in Cybercrime	**8 Hours**
Introduction, Proxy Server and Anonymizers, Password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow	
MODULE 3: Phishing and Identity Theft:	**8 Hours**
Introduction, Phishing – Methods of Phishing, Phishing Techniques, Phishing Toolkits and Spy Phishing. Identity Theft – PII, Types of Identity Theft, Techniques of ID Theft. Digital Forensics Science, Need for Computer Cyber forensics and Digital Evidence, Digital Forensics Life Cycle.	
MODULE 4: Phishing and Identity Theft	**8 Hours**
Unix Command Lines, Backtrack Linux, Mac Ports, Cygwin, Windows Power Shell. NetCatCommands, Net Cat Uses, SSH, Data Pipe, Fpipe	
MODULE 5: Network Defense tools	**8 Hours**
Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless VsStateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.	
PRACTICAL COMPONENT	
The student should be made to:	

- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

1.Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:

a) Caesar Cipher

b) Playfair Cipher

c) Hill Cipher

d) Vigenere Cipher

e) Rail fence – row & Column Transformation

2. Implement the following algorithms

a) DES

b) RSA Algorithm

c) Diffiee-Hellman

d) MD5

e) SHA-1

3. Implement the Signature Scheme - Digital Signature Standard

4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG)

5. Setup a honey pot and monitor the honeypot on network (KF Sensor)

6. Installation of rootkits and study about the variety of options.

7. Perform wireless audit on an access point or a router and decrypt WEP and WPA. (Net Stumbler)

8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

Question Paper Pattern:

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

Text Books:

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding cyber crimes, computer forensics and legal perspectives", Wiley India Pvt. Ltd, 2013
2. James Graham, Ryan Olson, Rick Howard, "Cyber SecurityEssentials", CRC Press 2010

Reference Books:

1. Bill Nelson, Amelia Philips and Christopher Steuart, "Guide to Computer Forensics and Investigations", 4th Edition, 2015
2. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
3. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.

COURSE OUTCOMES (CO)

CO1: To Create Solutions in Incident Handling and Implement Cyber security Best Practices and Risk Management

CO2: Communicate in a Written and Professional Manner to Strategize Identify and Implement Legal Ramifications

CO3: Integrate Network Monitoring and Present Real-Time Solutions Understand Software Design and Secure Practices
CO4: Implement Cyber security concepts in real time projects

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**		**3**									
CO2	**2**		**3**							**1**		
CO3			**3**							**1**		
CO4	**1**		**2**		**3**							
Strength of correlation: Low-1, Medium- 2, High-3												

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Semester	III						
Course Title	MINI PROJECT-2						
Course Code	MCAM35						
Category	PBLC						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	04	00	04	50	02
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Students will develop an application using any latest technology**

Synopsis **50 hours**

- 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 internal and external examiners for 50 marks.

TEACHING LEARNING PROCESS: Power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Design and develop an application for real world scenario.

SCHEME FOR EXAMINATIONS

- 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 internal and external examiners for 50 marks.

MAPPING of COs with POs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3	2	2		3	3	3	3	3

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Course Title	INDUSTRY INTERNSHIP						
Course Code	MCAI36						
Category	INT						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	-						02
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- **Students will develop an application using any latest technologies**

Internship - Guidelines

- The students should undergo an internship for 4 weeks during the vacation soonafter the 2rd semester SEE.
- The internship shall be carried out in an Industry/R&D labs or Institution
- The student should submit the internship report and make the presentation to theinternal 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: Learn new technology and implement in the real-world problems in association with the industry.

SCHEME FOR EXAMINATIONS

- The internal panel will evaluate the internship work for 50 Marks.
- SEE will be conducted for Internship and will be evaluated for 50 Marks

MAPPING of COs with POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	1	2		3	2	2		3			3	

SCHEME OF TEACHING AND EXAMINATION OF MCA FOURTH SEMESTER

2024-2026

Sl. No.	Course Type	Course Code	Course Title	Teaching hours per week			Examination				Credits
				Lecture	Tutorial/ Seminar	Practical / Project	Duration in hours	SEE Marks	CIE Marks	Total Marks	
1.	NCMC	MMC41	MOOC	Classes and evaluation procedures are as per the policy of the online course providers.							PP
2.	SEC	MCAS42	Technical Seminar	-	2	-	3	-	50	50	02
3.	PROJ	MCAP43	Project Work	1 SEMESTER DURATION			3	100	50	150	14
			Total	-	-	-	3	100	100	200	16

Note:

SEC : Skill Enhancement Course **NCMC: Non-credit Mandatory Course**

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<table>
<tr><td>Semester</td><td colspan="6">IV</td></tr>
<tr><td>Course Title</td><td colspan="6">MOOC</td></tr>
<tr><td>Course Code</td><td colspan="6">MMC41</td></tr>
<tr><td>Category</td><td colspan="6">NCMC/SEC</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td>Total teaching hours</td><td>Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td><td></td><td></td></tr>
<tr><td></td><td colspan="5">Classes and evaluation procedures are as per the policy of the online course providers.</td><td>PP</td></tr>
<tr><td colspan="7">Classes and evaluation procedures are as per the policy of the online course providers.</td></tr>
</table>

Guidelines

- A student has to register and complete MOOC course individually
- Students shall take up any online courses which is chosen from any platform like NPTL, Swayam, in the areas of Technical subjects, Technical writing, Aptitude skills, Personality Development etc..
- The course duration must span 4-12 weeks.
- This course does not have any CIE or SEE however, student must produce completion certificate for the course taken up during their MCA Course. The result is decided either pass or fail based on the course in the stipulated time.
- Passing NPTL is mandatory .

COURSE OUTCOMES:

CO1- Acquiring a sound technical knowledge of their selected course topic

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3			

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Semester	IV						
Course Title	TECHNICAL SEMINAR						
Course Code	MCAS42						
Category	SEC						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	-	02
CIE Marks: 50	SEE Marks: -		Total Max. marks=50		Duration of SEE: 3 hours		

COURSE OBJECTIVE:

- Students will Present technical seminar by learning new technologies

Seminar Guidelines

- Obtain the approval from the guide for the selected topic.
- Study of topic: Students are informed to acquire a thorough knowledge on the subject by referring back papers and reference books (These may be included as references at the end of the paper) on the corresponding area.
- Preparation of slides for presentation: Slides may be presented in MS power point.
- Time allowed for presentation is 20 minutes for presentation and 5 minutes for discussions. So, number of slides may be around 20 - 25 to adhere the time limit. Organization of slides:
- The first slide will be a title page showing the title, name of student (presenter), USN. and Semester. 2nd page will contain overview of the seminar
- Successive pages will contain objectives of the paper Introduction Body of the paper includes system dynamics, methodology, graphs, block diagrams etc. arranged in a logical sequence depending on the problem. Results and discussions

COURSE OUTCOMES:

CO1- Demonstrate a sound technical knowledge of their selected seminar topic

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3				2	2		3			

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Semester	IV						
Course Title	PROJECT WORK						
Course Code	MCAP43						
Category	PROJ						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	1 semester duration						14
CIE Marks: 50	SEE Marks: 100		Total Max. marks=150		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

CO1: Apply the student's knowledge and implementation skills. Learn any specific technical skills required and apply them to the project work.

Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

- Follow the Software Development life cycle
- Data Collection, Planning
- Design the Test cases
- Validation and verification of attained results
- Significance of parameters w.r.t scientific quantified data.
- Publish the project work in reputed Journal.

SCHEME FOR EXAMINATIONS

- 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 shall be evaluated jointly by both the internal and external examiners for 100 marks.
- **Dissertation evaluation and Viva -voce marks will be scaled down to 75 each.**
- **The student shall publish the project outcome in the reputed journals.**

COURSE OUTCOMES:

CO1: Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	2	2	3	3	3	3
Strength of correlation: Low-1, Medium- 2, High-3												