

**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 2024-25**

# **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

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
<b>Total</b>				<b>18</b>	<b>-</b>	<b>08</b>	<b>27</b>	<b>450</b>	<b>450</b>	<b>900</b>	<b>22</b>

2024-2026

**Note:**

**PCC** : Professional Core Course

**BSC** : Basic Science Course

**AEC** : Ability Enhancement Course

**T** : Theory

**L** : Lab

**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/ Assessment	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	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	-	2	2	3	50	50	100	2
<b>Total</b>				<b>16</b>	<b>02</b>	<b>10</b>	<b>27</b>	<b>450</b>	<b>450</b>	<b>900</b>	<b>22</b>

**Note:**

PCC : Professional Core Course  
 PCCL : Professional Core Course Lab  
 IPEC : Integrated Professional Elective Course  
 T : Theory  
 L : Lab

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

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## **Department of Master of Computer Applications**

### **MCA SECOND SEMESTER ELECTIVE COURSES**

#### **Elective – 1**

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

#### **Elective – 2**

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

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### 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	IPEC	MCAU31x	Specialization-1	3	-	2	3	50	50	100	4
2	IPEC	MCAU32x	Specialization-2	3	-	2	3	50	50	100	4
3.	IPEC	MCAU33x	Specialization-3	3	-	2	3	50	50	100	4
4	PBLC	MAEC34	Ability Enhancement Course	-	-	4	3	50	50	100	2
5.	INT	MCAI35	Industry Internship	-	-	-	-	50	50	100	6
<b>Total</b>				<b>9</b>	<b>-</b>	<b>10</b>	<b>12</b>	<b>250</b>	<b>250</b>	<b>500</b>	<b>20</b>

**Note:**

**PBLC** : Project Based Learning Course

**INT** : Internship

**IPEC** : Integrated Professional Elective Course

**AEC** : Ability Enhancement Course

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## **Department of Master of Computer Applications**

### **MCA THIRD SEMESTER ELECTIVE COURSES**

#### **Specialization-1**

##### **Artificial Intelligence & Machine Learning**

<b>S.No</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Course Title</b>
<b>1.</b>	<b>IPEC</b>	<b>MCAU311</b>	<b>Machine Learning and Deep Learning</b>
<b>2.</b>	<b>IPEC</b>	<b>MCAU312</b>	<b>Artificial Intelligence</b>
<b>3.</b>	<b>IPEC</b>	<b>MCAU313</b>	<b>Generative AI and its Applications</b>

#### **Specialization-2**

##### **Web Applications and analytics**

<b>S.No</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Course Title</b>
<b>1.</b>	<b>IPEC</b>	<b>MCAU321</b>	<b>Full Stack Web Development</b>
<b>2.</b>	<b>IPEC</b>	<b>MCAU322</b>	<b>Advanced Java Programming</b>
<b>3.</b>	<b>IPEC</b>	<b>MCAU323</b>	<b>Web Marketing and Analytics</b>

#### **Specialization-3**

##### **System Security**

<b>S.No</b>	<b>Course Type</b>	<b>Course Code</b>	<b>Course Title</b>
<b>1.</b>	<b>IPEC</b>	<b>MCAU331</b>	<b>Blockchain Technology</b>
<b>2.</b>	<b>IPEC</b>	<b>MCAU332</b>	<b>Cyber Security</b>
<b>3.</b>	<b>IPEC</b>	<b>MCAU333</b>	<b>Ethical Hacking</b>



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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.	NCMC	MRMI42	Research Methodology and IPR (online)								PP
3.	PROJ	MCAP43	Project Work	1 SEMESTER DURATION			3	100	50	150	16
<b>Total</b>				-	-	-	3	100	50	150	16
<b>Grand Total</b>											
<b>Total Marks: 2450</b>					<b>Total Credits: 80</b>						
<b>Note:</b>											
SEC : Skill Enhancement Course					NCMC: Non-credit Mandatory Course						
PROJ : Project Work					PP : Passing is Mandatory						
MRMI: Research Methodology & IPR					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**

<b>Course Type</b>	<b>Semester-1 Credits</b>	<b>Semester-2 Credits</b>	<b>Semester-3 Credits</b>	<b>Semester-4 Credits</b>	<b>Total Credits</b>
<b>Basic Science Course (BSC)</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>Professional Core Course (PCC)</b>	<b>9</b>	<b>6</b>	<b>-</b>	<b>-</b>	<b>15</b>
<b>Professional Elective Course (PEC)</b>	<b>-</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>3</b>
<b>Integrated Professional Core Course (IPCC)</b>	<b>8</b>	<b>6</b>	<b>-</b>	<b>-</b>	<b>14</b>
<b>Integrated Professional Elective Course (IPEC)</b>	<b>-</b>	<b>3</b>	<b>12</b>	<b>-</b>	<b>15</b>
<b>Labs (PCCL)</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>4</b>
<b>Mini Project (PBL)</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>4</b>
<b>Seminar (SEC)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Internship (INT)</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>6</b>
<b>Project Work (PROJ)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>16</b>	<b>16</b>
<b>Total Credits</b>	<b>22</b>	<b>22</b>	<b>20</b>	<b>16</b>	<b>80</b>

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## **Department of Master of Computer Applications**

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

	<b>Credits for the TWO Year MCA Program- Scheme 2024</b>						
<b>Semester</b>	<b>Core</b>	<b>Practical</b>	<b>Elective</b>	<b>Project / Industry Internship</b>	<b>Bridge Course</b>	<b>Total Credits</b>	<b>Total Marks</b>
<b>I</b>	<b>19</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>21</b>	<b>900</b>
<b>II</b>	<b>12</b>	<b>2</b>	<b>6</b>	<b>2</b>		<b>22</b>	<b>900</b>
<b>III</b>	<b>-</b>	<b>-</b>	<b>12</b>	<b>8</b>		<b>20</b>	<b>500</b>
<b>IV</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>17</b>		<b>17</b>	<b>150</b>
<b>Total</b>						<b>80</b>	<b>2450</b>

### **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 features**

<b>Assessment</b>	<b>Marks</b>	<b>Min. Passing marks</b>
<b>Average of best two of three CIE tests conducted</b>	<b>30</b>	<b>15</b>
<b>Assignment</b>	<b>10</b>	<b>5</b>
<b>Seminar</b>	<b>5</b>	<b>2.5</b>
<b>Group Activity</b>	<b>5</b>	<b>2.5</b>
<b>Total</b>	<b>50</b>	<b>25</b>

### **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 - ups 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))

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

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

**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**

<b>UNIT I: Java Programming Fundamentals</b>	<b>08 hours</b>
The Java Language, The Key Attributes of Object-Oriented Programming, A First Simple Program, Handling Syntax Errors	
<b>Introducing Data Types and Operators:</b> 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.	
<b>More Data Types and Operators: Arrays,</b> Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, The For-Each Style for Loop, Strings, The Bitwise operators.	
<b>UNIT II: Introducing Classes, Objects and Methods</b>	<b>08 hours</b>
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.	
<b>A Closer Look at Methods and Classes:</b> 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.	
<b>Inheritance:</b> 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.	
<b>UNIT III: Interfaces</b>	<b>08 hours</b>

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 Hortsman, 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**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>							
<b>CO</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>							
<b>CO</b>		<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>							
<b>CO</b>		<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>			<b>2</b>		<b>3</b>	<b>3</b>	
<b>Strength of correlation:</b> 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	<b>I</b>						
Course Title	<b>WEB TECHNOLOGIES</b>						
Course Code	<b>MCAT12</b>						
Category	<b>Professional Core Course(PCC)</b>						
Scheme and Credits	No. of Hours/Week					Total	Credits
	L	T	P	SS	Total	teaching hours	
	03	00	00	00	03	40	03
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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.

<b>UNIT I: Introduction to Web &amp; HTML5</b>	<b>10 hours</b>
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	
<b>UNIT II: Bootstrap components</b>	<b>08 hours</b>
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	
<b>UNIT III: Java Script</b>	<b>08 hours</b>
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	
<b>UNIT IV: Server-side scripting</b>	<b>08 hours</b>
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.	
<b>UNIT V: Handling structured and Unstructured data</b>	<b>06 hours</b>

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	
<b>Strength of correlation:</b> Low-1, Medium- 2, High-3												

**Dr Ambedkar Institute of Technology, Bengaluru-56**

**Department of Master of Computer Applications**

**Scheme and Syllabus - 2024 -2026**

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

**COURSE OBJECTIVES:**

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

<b>UNIT I: Architecture and Physical Layer</b>	<b>8 hours</b>
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	
<b>UNIT II: Data Link Layer</b>	<b>8 hours</b>
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	
<b>UNIT III: Network Layer</b>	<b>8 hours</b>
The Network Layer- Network Layer Design issues, Routing algorithms- Optimality Principle - Shortest Path Algorithm, Distance Vector Routing, Flooding, Multicast routing protocol	
<b>UNIT IV: Internet Protocols and Quality Control</b>	<b>8 hours</b>
Internetworking, IPv4, IPv6, ICMP, ARP, Congestion Control Algorithms, Quality of Service	
<b>UNIT V: Network Simulation using NS</b>	<b>8 hours</b>
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. Uyles 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	<b>MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS</b>						
Course Code	<b>MCAT14</b>						
Category	<b>Basic Science Course (BSC)</b>						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>		<b>Total Max. marks=100</b>		<b>Duration of SEE: 03 Hours</b>		

**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.

<b>UNIT I: Matrix Algebra</b>	<b>8 hours</b>
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 Linear Programming Problem-Applications, Types, Solving Linear Problems-Simplex method.	
<b>UNIT II: Sets, Relations &amp; Functions</b>	<b>8 hours</b>
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	
<b>UNIT III: Mathematical Logic</b>	<b>8 hours</b>
Propositions and logical operators, Truth table, Propositions generated by a set Logical equivalence-converse, inverse and contrapositive, logical implications, Quantifiers, Rules of Inference	
<b>UNIT IV: Statistics</b>	<b>8 hours</b>
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. Curve fitting: Curve fitting by the method of least square-fitting the curves of the form $Y=ax+b$ , $y=ab^x$ , $y=ax^2+bx+c$	
<b>UNIT V: Probability Distributions and Graph theory</b>	<b>8 hours</b>
Theory of probability-Binomial distribution, Poisson distribution, Exponential 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.	

**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 analyse 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
<b>CO1</b>	1	2										
<b>CO2</b>	1	2	3									
<b>CO3</b>	3	1	2	2								
<b>CO4</b>	3	2	2	1								
<b>Strength of correlation: Low-1, Medium- 2, High-3</b>												

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

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

**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.

<b>UNIT I: Introduction to Data Structures and Algorithms</b>	<b>08 hours</b>
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.	
<b>UNIT II: Binary Trees</b>	<b>08 hours</b>
Basic concepts, Binary trees and its properties, operations on Binary Trees, Binary tree Traversals, Binary Search Tree (BST): insertions and deletions operation on BST.	
<b>UNIT III: Algorithm Analysis and Algorithmic Paradigms</b>	<b>08hours</b>
Notion of Algorithms, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms <b>Divide-and-Conquer:</b> Merge sort, Quicksort, Binary Search	
<b>UNIT IV: Algorithm Design Techniques</b>	<b>08 hours</b>
The General method, Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s Algorithm, Warshall’s and Floyd’s Algorithms.	
<b>UNIT V: Graph Algorithms.</b>	<b>08 hours</b>
The Knapsack Problem, <b>Decrease-and-Conquer:</b> <b>Depth</b> First and Breadth First Search, <b>Backtracking:</b> n-Queens problem	
<b>Lab Component:</b>	<b>2 hours / week per batch</b>
<ol style="list-style-type: none"> <li>1. Design a program to perform different operations on STACK of integers.</li> <li>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.</li> <li>3. Implement the insert and delete operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX).</li> </ol>	



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							
<b>Strength of correlation: Low-1, Medium- 2, High-3</b>												

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

Semester	<b>I</b>						
Course Title	<b>Fundamentals of C Programming</b>						
Course Code	<b>MCAU16</b>						
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
<b>CIE Marks: 30+20=50</b>	<b>SEE Marks: 50</b>		<b>Total Max. marks=100</b>		<b>Duration of SEE: 03 Hours</b>		

**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

<b>UNIT I: Algorithms and Flowcharts</b>	<b>8 hours</b>
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.	
<b>UNIT II: Arrays and Strings</b>	<b>8hours</b>
Handling one-dimensional and two-dimensional arrays – dynamic arrays Handling Strings: String operations and string functions – handling arithmetic operations in strings	
<b>UNIT III: User Defined Functions</b>	<b>8 hours</b>
User defined functions: Elements, Handling function calls – Arrays and Functions	
<b>UNIT IV: Structures and Unions</b>	<b>8 hours</b>
Handling structures - array of structures - structures within structures, structures and functions.	
<b>UNIT V: Pointers and File Management</b>	<b>8 hours</b>
Understanding pointers - chain of pointers - pointers and arrays - pointer and character strings - array of pointers, pointer as functions	
<b>Lab Component:</b>	<b>2 hours / week per batch</b>
<ol style="list-style-type: none"> <li>1. Write a C program to find the roots of a quadratic equation.</li> <li>2. Write a C program to generate Fibonacci Series.</li> <li>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.</li> <li>4. Write a C program that uses functions to perform the following: i) Addition of Two Matrices ii) Multiplication of Two Matrices.</li> <li>5. Write a C program to determine if the given string is a palindrome or not.</li> <li>6. Write a C program which copies one file to another.</li> </ol>	

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 fundamentals 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, 3<sup>rd</sup> Edition, Cengage Learning,2013
2. M G Venkateshmurthy: Programming Techniques through C, Pearson Education, 2017
3. Ivor Horton: Beginning C from Novice to professional, 7<sup>th</sup> 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	PO11	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
<b>Strength of correlation:</b> 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	<b>I</b>						
Course Title	<b>OBJECT ORIENTED PROGRAMMING USING JAVA LAB</b>						
Course Code	<b>MCAL17</b>						
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
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. Marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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 ArrayIndexOutOfBounds, FileNotFoundException and NumberFormatException.

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

### 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	
<b>Strength of correlation: Low-1, Medium- 2, High-3</b>												

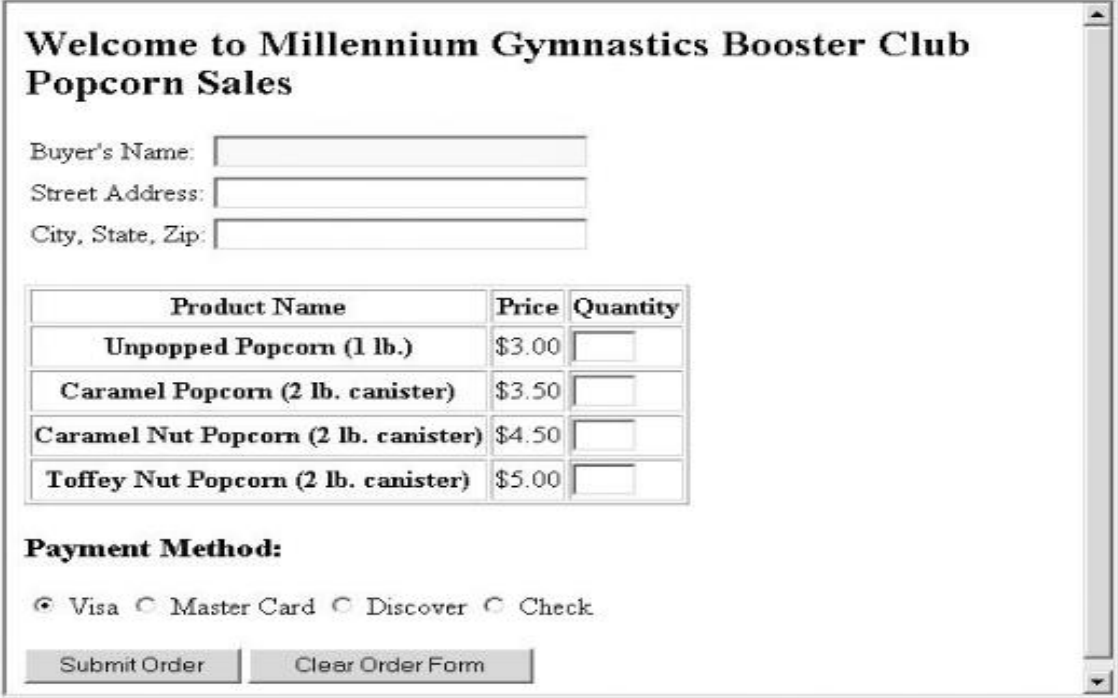
**Dr Ambedkar Institute of Technology, Bengaluru-56**  
**Department of Master of Computer Applications**  
**Scheme and Syllabus - 2024 -2026**

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
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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.  <b>Sample Output</b>

	
4.	<p>Write JavaScript to validate the following fields of the Registration page.</p> <p>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).</p>
5.	<p>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.</p>
6.	<p>Create HTML form with Name of License Holder, Fuel type, Vehicle Type, Registration Number, Make &amp; Model, Year of Registration. On submitting, store the values in MySQL table. Retrieve and display the data based on name.</p>
7.	<p>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.</p>
8.	<p>Demonstrate the working of JSON Structures with HTML.</p>

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

**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.**

<b>UNIT I: Matrices and Determinants</b>	<b>8 hours</b>
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	
<b>UNIT II: Sets and Relations</b>	<b>8 hours</b>
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.	
<b>UNIT III: Sequence and Series</b>	<b>8 hours</b>
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.	
<b>UNIT IV: Statistics</b>	<b>8 hours</b>
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	
<b>UNIT V: Probability Theory</b>	<b>8 hours</b>
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.	
<b>TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos</b>	

## 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								
<b>Strength of correlation:</b> 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	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
<b>CIE Marks: 50</b>	<b>SEE Marks:50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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**

<p><b>UNIT I: Python Basic Concepts and Programming</b> <span style="float: right;"><b>08 hours</b></span>  <b>Introduction to Python programming:</b> Features of Python, Execution of a Python Program, Data types in Python, operators, Control Statements, Functions</p>
<p><b>UNIT II: Python Data Collections</b> <span style="float: right;"><b>08 hours</b></span>  <b>Strings:</b> Creating and storing strings, string operations, formatting Strings.  <b>Lists:</b> Basic List operations, Built in functions used on lists, List Comprehensions.  <b>Tuples and Sets:</b> Basic Operations on Tuples, Functions to Process Tuples.  <b>Sets:</b> Set Methods, set operations.  <b>Dictionaries:</b> Operations on Dictionaries, Dictionary Methods.</p>
<p><b>UNIT III: Numpy, Pandas and Data Visualization</b> <span style="float: right;"><b>08 hours</b></span>  <b>Numpy:</b> The Numpy Array, N-dimensional array operations and manipulations. Data processing using arrays.  <b>Pandas:</b> Essential Functionality, Data frames, computing descriptive statistics, Time series analysis with pandas.  <b>Data Visualization:</b> Matplotlibs package-plotting graphs-controlling Graph-Adding Text- More Graph types. Data Visualization with Seaborne.</p>
<p><b>UNIT IV: Files and Database Connectivity, Regular Expressions</b> <span style="float: right;"><b>08 hours</b></span>  <b>Files and Database Connectivity:</b> File Processing in python, Types of Databases Used with Python, <b>working with MySQL Database:</b> 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  <b>Regular Expressions:</b> Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files.</p>

**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**  
**Department of Master of Computer Applications**  
**Scheme and Syllabus - 2024 -2026**

Semester	<b>II</b>						
Course Title	<b>SOFTWARE ENGINEERING</b>						
Course Code	<b>MCAT22</b>						
Category	<b>Professional Core Course (PCC)</b>						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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**

<b>UNIT I: Requirements Engineering</b>	<b>8hours</b>
Software requirements Fundamentals, Requirements process, Requirements elicitation, Requirements Analysis, Requirements specification, Requirements validation, Practical consideration, Requirement tools	
<b>UNIT II: Software Architecture and Design</b>	<b>8hours</b>
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	
<b>UNIT III: Software Implementation Methods and Tools</b>	<b>8hours</b>
Software implementation Fundamentals, Managing software Implementation, Practical considerations, software Implementation Tools, software implementation Technologies, Product Documentation, Formal software Implementation methods	
<b>UNIT IV: Software Testing and Software Quality</b>	<b>8hours</b>
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	
<b>UNIT V: Software Project Management</b>	<b>8hours</b>
Initiation and Scope definition, Software project planning, software project implementation plans, Review and evaluation, software closure activities, software engineering measurement, Software management tools	

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

**COURSE OUTCOMES:**

**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, 10<sup>th</sup> 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, 4<sup>th</sup> 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	
<b>Strength of correlation:</b> 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	<b>II</b>						
Course Title	<b>DATA SCIENCE</b>						
Course Code	<b>MCAT23</b>						
Category	<b>Professional Core Course (PCC)</b>						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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.**

<b>UNIT I: Introduction to Data Science</b>	<b>8 hours</b>
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	
<b>UNIT II: Data Pre-processing and Data Wrangling</b>	<b>8 hours</b>
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	
<b>UNIT III: Hypothesis Testing</b>	<b>8 Hours</b>
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.	
<b>UNIT IV: Data Analytics</b>	<b>8 hours</b>
Understanding Linear regression, making prediction-hypothesis on regression coefficients, Adding best fit. Multiple Linear Regression, Polynomial Regression, Model Evaluation	
<b>UNIT V: Data Analytics &amp; Data Visualization</b>	<b>8 hours</b>
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=tA42nHmEKw>
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
<b>Strength of correlation:</b> Low-1, Medium- 2, High-3												



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

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

**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

<b>UNIT 1: Introduction</b>	<b>6 Hours</b>
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	
<b>UNIT-2: Entity-Relationship Model</b>	<b>5 Hours</b>
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	
<b>UNIT 3: Introduction to SQL</b>	<b>5 Hours</b>
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	
<b>UNIT 4: Working on SQL Queries and normalization</b>	<b>5 hours</b>
Working with subqueries, SQL joins, Complex queries, Handling views – Data control language commands	
<b>UNIT 5: Normalization and Transaction Management</b>	<b>5 Hours</b>
Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms based on Primary Keys, General Definitions of 2 <sup>nd</sup> and 3 <sup>rd</sup> Normal Forms, Boyce Codd Normal Forms Transaction Concept, ACID Properties - A Simple Transaction Model, Transaction model states, Serializability	

<b>PRACTICAL COMPONENT</b>
<b>List of Laboratory programs (2 hours/week per batch)</b>
Consider the following relational tables:

	<ol style="list-style-type: none"> <li>1. Doctor(<u>docid</u> integer(5), docname varchar(25), specialization varchar(20), experience integer(2), dob varchar(10) )</li> <li>2. Patient(<u>pid</u> integer(5), pname varchar(25), dob date, date_of_admission date)</li> <li>3. Staff(<u>staffid</u> integer(5), sname varchar(25), designation varchar(25), date_of_joining date, on_contract boolean default value 0)</li> <li>4. Room(<u>roomid</u> integer(5), type varchar(25), AC boolean)</li> <li>5. Treated_by(docid, pid, treatment_for varchar(10), consultant_fees integer(4))</li> <li>6. Occupied_at(pid, roomid)</li> <li>7. Supervising(staffid, roomid)</li> </ol>
<ol style="list-style-type: none"> <li>1.</li> </ol>	<p>Demonstrate the DDL commands.</p> <ul style="list-style-type: none"> <li>• Update the doctor table to change the domain of dob to date.</li> <li>• Add a field 'address' to patient table.</li> <li>• Add a field 'age' to patient table.</li> <li>• Demonstrate deletion of a field in a table.</li> <li>• Demonstrate removal of a table.</li> </ul>
<ol style="list-style-type: none"> <li>2.</li> </ol>	<p>Demonstrate the DML commands to</p> <ul style="list-style-type: none"> <li>• Insert data to the above fields.</li> <li>• Update the contract of all staffs to permanent.</li> <li>• Delete the data of all patients admitted before 2005.</li> <li>• Update the designation of all staffs who had joined after 2020 to Senior_Level_staff.</li> <li>• Update the AC field of all rooms of type "VIP" to value 1.</li> </ul>
<ol style="list-style-type: none"> <li>3.</li> </ol>	<p>Apply Querying techniques to fetch data from single table. Sample queries as follows:</p> <ul style="list-style-type: none"> <li>• Fetch the details of all doctors.</li> <li>• Fetch the age of all patients.</li> <li>• Fetch the details of the doctors and age of all doctors with more than 10 years of experience.</li> <li>• Fetch the details of all staffs who are not permanent.</li> <li>• Find the average experience of doctors specialized in cardiology.</li> <li>• Find the total number of senior level staffs who had joined in the year 2019.</li> </ul>
<ol style="list-style-type: none"> <li>4.</li> </ol>	<p>Apply querying techniques to fetch data from multiple tables. Sample queries as follows:</p> <ul style="list-style-type: none"> <li>• Find the id and name of patients and doctors treating them.</li> <li>• Find the names of patients, doctors and disease treated for.</li> <li>• Fetch the patient details and treatment taken for and fees charged.</li> <li>• Find the patients who are treated by doctor 'Dilip'.</li> <li>• Find the doctors who are treating the patient 'Ranjith'.</li> <li>• Find the patients who are treated by cardiologists.</li> <li>• Find the details of the patients and the rooms they are occupying.</li> <li>• Find the details of the patients occupied in AC rooms.</li> <li>• Fetch the details of the patients who are treated by the doctor with highest experience.</li> </ul>
<ol style="list-style-type: none"> <li>5.</li> </ol>	<p>Demonstrate the implementation of joins in SQL. Sample queries as in Q.No.4.</p>
<ol style="list-style-type: none"> <li>6.</li> </ol>	<p>Demonstrate the implementation of views in SQL. Sample queries as in Q.No.4.</p>

**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, 3<sup>rd</sup> Editionon, 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	
<b>Strength of correlation: Low-1, Medium- 2, High-3</b>												

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

Semester	<b>II</b>						
Course Title	<b>CLOUD ESSENTIALS</b>						
Course Code	<b>MCAU251</b>						
Category	<b>Integrated Professional Elective Course (IPEC)</b>						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	<b>02</b>	<b>00</b>	<b>02</b>	<b>00</b>	<b>04</b>	<b>26+24</b>	<b>3</b>
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.**

<b>UNIT I: Cloud Computing Overview:</b>	<b>06 hours</b>
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.	
<b>UNIT II: Cloud Architecture and Design:</b>	<b>05 hours</b>
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.	
<b>UNIT III: Cloud Networking:</b>	<b>05 hours</b>
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).	
<b>UNIT IV: Cloud Security and Billing:</b>	<b>05 hours</b>
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.	
<b>UNIT V: Cloud Case Studies &amp; Future of Cloud Computing:</b>	<b>05 hours</b>
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 Madiseti, 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**

	P	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
<b>Strength of correlation:</b> Low-1, Medium- 2, High-3												

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

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

**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.**

<b>UNIT I: Introduction to BigData</b>	<b>6 hours</b>
Introduction, Applications, Basic Nomenclature, Analysis Process Model, Analytical model Requirements, cloud and Big Data –Predictive Analytics, CrowdSourcing Analytics, Inter-and Trans-Firewall Analytics.	
<b>Hadoop Fundamentals</b>	
Data, Data Storage and Analysis, Grid Computing, Volunteer Computing, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.	
<b>UNIT II: The Hadoop Distributed File system</b>	<b>5 hours</b>
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	
<b>UNIT III: MapReduce</b>	<b>5 hours</b>
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	
<b>UNIT IV: NOSQL and Hadoop Tool</b>	<b>5 hours</b>
Introduction to NoSQL, Key-value pair databases, Document databases, Column family databases, Graph databases.	
<b>Hadoop Tool-Pig</b>	
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.	
<b>UNIT V: Hadoop Tool-Hive</b>	<b>5 hours</b>

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.
<b>PRACTICAL COMPONENT</b> <b>List of Laboratory programs (2 hours/week per batch)</b>
<ol style="list-style-type: none"> <li>Hadoop Installation.</li> <li>Installation of VMWare to setup the Hadoop environment and its ecosystems.</li> <li>Implement the following file management tasks in Hadoop: Adding files and directories ii. Retrieving files iii. Deleting files</li> <li>Installation of PIG. Write Pig Latin scripts sort, group, join, project, and filter your data.</li> <li>Installation of HIVE. Use Hive to create, alter, and drop databases, tables, views, functions.</li> </ol>
<b>TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos</b>

### 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:

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

### Reference Books:

- 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	



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

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

**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**

<b>UNIT I :</b>	<b>6 Hours</b>
GO: Getting started – Go Primer: Variables, Functions, Looping E numerations, Structures, Methods, Interfaces, Numbers, Go Error, object-oriented programming concepts	
<b>UNIT II:</b>	<b>5 Hours</b>
Generic and Specialized Generic Data Structures, Arrays – Slices – Strings, Collections: Maps, Lists	
<b>UNIT III:</b>	<b>5 Hours</b>
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	
<b>UNIT IV:</b>	<b>5 Hours</b>
Concurrency with Shared Variables Semaphores and Threads, Reflection and Low-level Programming	
<b>UNIT V:</b>	<b>5 Hours</b>
The Go test Tool, Test Functions, Benchmark functions, profiling - Implementation Connecting to servers, Distributing Go, Serving Objects, Calling Remote procedures	
<b>PRACTICAL COMPONENT</b>	
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.
<b>TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos</b>	

### 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 Addison Wesley
2. The GO Programming Language by Alan A. A. Donovan, Brian W. Kernighan published by Addison 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

<b>COURSE OUTCOMES MAPPING WITH PROGRAM OUTCOMES</b>												
<b>LEVEL OF CO-PO MAPPING TABLE</b>												
CO/PO	PO1	PO2	PO3	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**

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

**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.**

<b>UNIT I: Introduction to software architecture</b>	<b>8 hours</b>
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	
<b>UNIT II: Quality Attributes</b>	<b>8 hours</b>
Quality attribute scenarios in practice. System quality attributes. Achieving Quality attributes: Availability; Modifiability; Performance; Security; Testability; Usability, Business Qualities	
<b>UNIT III: Applying Tactics</b>	<b>8 hours</b>
Applying Tactics: Availability tactics, Interoperability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics	
<b>UNIT IV: Architectural Styles</b>	<b>8 hours</b>
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	
<b>UNIT V: Applying architectural patterns</b>	<b>8 hours</b>
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**

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

**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

<b>UNIT I: Introduction</b>	<b>8 hours</b>
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	
<b>UNIT II: Artificial Neural Networks</b>	<b>8 hours</b>
ADALINE, MADALINE, ANN: (2 <sup>nd</sup> generation NN), Introduction, BPN, KNN, HNN, BAM, RBF, SVM and illustrative problems.	
<b>UNIT III: Fuzzy Logic</b>	<b>8 hours</b>
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.	
<b>UNIT IV: Genetic Algorithms</b>	<b>8 hours</b>
Introduction to Hypothesis, basic Concepts concerning testing of Hypothesis, Procedure and Flow diagram for Hypothesis, Measuring the power of a Hypothesis test, Testing of Hypotheses: Parametric test: z-test, t-test :one sample mean and two sample mean , Non parametric test-Chi Square.	
<b>UNIT V: Swarm Intelligent System</b>	<b>8 hours</b>
Introduction, Background of SI, Ant Colony System, Working of ACO, Particle Swarm Intelligence (PSO).	
<b>TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos</b>	

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

**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.**

<b>UNIT I: Introduction to Testing:</b>	<b>08 hours</b>
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.	
<b>UNIT II: User Interface Testing:</b>	<b>08 hours</b>
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().	
<b>UNIT III: Handling Web Elements</b>	<b>08 hours</b>
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.	
<b>UNIT IV: Application Programming Interface (API) Testing:</b>	<b>08 hours</b>
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.	
<b>UNIT V: Database Testing:</b>	<b>08 hours</b>

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 Gopaldaswamy: 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

	P	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 Master of Computer Applications**  
**Scheme and Syllabus - 2024 -26**

Semester	<b>II</b>						
Course Title	<b>PYTHON PROGRAMMING LAB</b>						
Course Code	<b>MCAL27</b>						
Category	<b>PCCL</b>						
Scheme and Credits	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.

<b>List of Programs</b>	
1.	Demonstrate a python program on <b>i) Control statements</b> i) Control statements a) Quadratic equation program b) Prime number generation c) Sum the digits d) Evaluate $1/2+2/3+3/4+\dots+n/n+1$ e) Count the number of ovels, consonants, numbers, uppercase letters, lowercase letters, numeric characters, white space characters. <b>ii) Functions</b> a) calculate the sum of the positive integers of $n+(n-2)+(n-4)\dots$ (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	<b>II</b>						
Course Title	<b>DATA SCIENCE LAB</b>						
Course Code	<b>MCAL28</b>						
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
<b>CIE Marks: 50</b>	<b>SEE Marks: 50</b>	<b>Total Max. marks=100</b>			<b>Duration of SEE: 03 Hours</b>		

**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.**

<b>List of Laboratory programs (2 hours/week per batch)</b> <b>10 lab sessions+ 1 repetition class+ 1 Lab Assessment.</b>	
<b>Python shall be used as an analytical tool to read, preprocess, analyse and visualize the data.</b> <b>Tableau shall be used for data visualization.</b>	
<b>1.</b>	Demonstrate the working of merge with <b>inner, outer, left and right joins</b> in python on a sample dataset.  Implement Group, Join, replace, concatenate on any given dataset.
<b>2.</b>	Perform one sample t-test and ANOVA test for a given scenario.
<b>3.</b>	Identify Outliers and implement different ways to treat outliers.
<b>4.</b>	Develop Python script to identify and treat missing values on a sample dataset.
<b>5.</b>	Formulate linear regression model for any data set and compare the analysis with polynomial regression.  Implement Multiple Linear Regression and evaluate the model for a sample dataset.
<b>6.</b>	Write a program to implement k-Nearest Neighbour algorithm to classify any given data set. Print both correct and wrong predictions.
<b>7.</b>	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.
<b>8.</b>	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
<b>Strength of correlation:</b> Low-1, Medium- 2, High-3												

**Dr Ambedkar Institute of Technology, Bengaluru-56**  
**Department of Master of Computer Applications**  
**Scheme and Syllabus - 2024 -26**

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

**Mini project using the following technologies:**

**Mobile application development/IOT/ Django frame work**

**COURSE OBJECTIVES:**

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

<b>PART - A</b>	
<b>Demonstrate the following concept using Android</b>	
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	
<b>Demonstrate the following concept using IOT</b>	
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 interface DHT11 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 retrieve temperature and humidity data from things speak cloud.

<b>OR</b>	
<b>Demonstrate the following concept using Django Framework</b>	
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
<b>Note 1: Student has to pick one question from the above list</b>	
<b>PART B- MINI-PROJECT</b>	
<p>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.</p> <p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li>In the examination, one exercise from part A is asked for 20 marks.</li> <li>The mini project under part B has to be evaluated for 30 marks.</li> <li>A team of two students must develop the mini project. However during the examination, each student must demonstrate the project individually.</li> <li>The team must submit a brief project report (25-30 pages) that must include the following <ul style="list-style-type: none"> <li>Introduction</li> <li>Requirement Analysis</li> <li>Software Requirement Specification</li> <li>Analysis and Design</li> <li>Implementation</li> <li>Testing</li> </ul> </li> <li>The report must be evaluated for 5 Marks. Demonstration and Viva for 15 Marks.</li> <li>Project report duly signed by the Guide and HOD need to be submitted during examination.</li> </ol>	

<b>TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos</b>
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**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**

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