

Shree H. V. P. Mandal's
Degree College of Physical Education, Amravati.
(Multi-Faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY
(ENGINEERING GROUP)



CURRICULUM SCHEMES OF ALL SEMESTERS
AND
SYLLABUS OF MCA FIRST YEAR SEMESTER I
(Aligned As Per NEP-2020 Guidelines)

MASTER IN COMPUTER APPLICATION
Program Code: MCA2025

Introduced From the Academic Year
(2025-2026)

Programme Structure for (MASTER IN COMPUTER APPLICATION)

1. **Programme Name (in Complete):** Master in Computer Application
2. **Programme Name (in Short):** MCA
3. **Nature of the Programme:** Post graduate Degree
4. **Objectives:**

The Programme Educational Objectives (PEOs) of MCA are:

The MCA program aims to provide comprehensive training in computer applications, with a strong focus on meeting industry demands and equipping students with the latest technological skills. With specialized knowledge in areas like Artificial Intelligence (AI), Machine Learning, Deep Learning, Data Science, and Cyber Security, students will be prepared to tackle real-world problems and contribute to innovative IT solutions.

5. **Duration of the Programme:** Two Years; Full-Time
6. **Examination Pattern:** Semester
7. **Number of Semesters:** Four Semesters
8. **Marking Scheme:** Credit-Based
9. **Total Working Days:** Per Semester: 100 Days
10. **Teaching and Examination Scheme:**
As prescribed in the curriculum design and approved by the Subject Board and Academic Board from time to time.

Programme Outcomes (POs)

PO (Program Outcomes) of MCA2025 (Master in Computer Application) Curriculum are overall outcomes covering different aspects of program objectives of the entire 2 year PG Program of Engineering group of Faculty of Science & Technology of Autonomous college Degree college of Physical Education. These are as given below:

PO1: Apply advanced knowledge of computer science and emerging technologies to solve real-world problems ethically and efficiently.

PO2: Design, develop, and deploy secure software solutions using modern tools and frameworks.

PO3: Communicate effectively, work collaboratively in diverse teams, and manage projects with leadership and professionalism.

PO4: Engage in lifelong learning, innovation, and entrepreneurship to adapt to evolving technology landscapes.

PO5: Demonstrate awareness of societal, environmental, and ethical responsibilities in the IT profession.

Programme Specific Outcomes(PSOs):

PSO (Program Specific Outcomes) of MCA2025 (Master in Computer Application) Curriculum focuses on specific skills and abilities related to field of computer applications, that student should acquire during and after the completion of the program. These are as given below:

PSO1: Develop efficient, scalable software systems and applications using programming, data structures, and algorithms.

PSO2:Build secure web, mobile, and cloud-based solutions leveraging databases and computing platforms.

PSO3: Integrate AI, ML, IOT, and cybersecurity principles into real-time applications and research projects.

PSO4: Apply software engineering and project management practices throughout the software development life cycle.

PSO5: Contribute to innovation, research, and entrepreneurship with effective technical communication and teamwork.

PSO6:Student should be able to design, develop and manage databases using various database management systems

PSO7:Students should be proficient in using current programming languages, software development tools and other advanced computing platforms to build software solutions.

PSO8:Students should be able to work effectively in teams, communicate technical information clearly and collaborate with others.

SPECIAL NOTE FOR THE STUDENTS

- 1) This is notified for general information and guidance of all concerned for admission and examination to Master of Science in Computer Science.
- 2) All the students desirous to take examinations for which this prospectus has been prescribed should if found necessary for any other information regarding examinations etc. refer the examination rules of this autonomous college.

Pattern of Question Papers for Semester / Final Examination of MCA in Choice Based Credit System

For Theory Examination (CBCS Curriculum)

1. Under the CBCS curriculum, the semester/final theory examinations shall be conducted for each course (subject) as per the schedule declared by the Examination Section.
2. The question papers shall be of maximum of 70 marks, containing ten questions—two questions for each unit — and students are required to attempt **any one of the two**.
3. No objective-type multiple-choice questions are allowed.
4. Every question will be of fourteen marks (14) and may contain sub-questions. Distribution of marks shall be given on the right of each question.
5. The questions' numbering will be as follows: Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.
6. The questions shall be targeted to evaluate **knowledge, skill, thinking ability, and application**.

For Practical Examination

1. External Practical examination of MCA will be based on practical experiment performance(s) of significance of 15 Marks and 10 Marks for viva.
2. Internal practical examination of 25 Marks will be based on attendance, Completion of practical performance in the laboratory.

**ExaminationLeadingtotheDegreeof Master In Computer Application
(Bi-annualPattern)(TwoYearCourse)**

Whereas, it is expedient to prepare a new rule for Examination leading to the Degree of Master In Computer Application (Bi-annual) (Two Year Course) under CBCS for the purposes here in after appearing in the Academic Council and Governing Body.

ExaminationRulesforMasterinComputerApplication(Bi-Annual)–TwoYearCourse(CBCS)

1. This rule may be called "**Examination of Master in Computer Application (Bi-Annual) (Two Year Course) CBCS.**"
2. This rule shall come into force **with effect from the session 2023–24** for the degree of **Master in Computer Application** (Bi-Annual Pattern) (Two Year Course) under CBCS.
3. Subject to their compliance with the provisions/rules in force from time to time.
4. The eligibility for the first and second year is mentioned in the table below.
5. The P.G. Diploma/P.G. Degree **Master in Computer Application** shall be awarded to an examinee who, in accordance with the provisions of this rule, qualifies for the degree.
6. Duration of the programme shall be **two academic years**.
 - o The First Year MCA is divided into two semesters, called **Semester I** and **Semester II**.
 - o The Second Year MCA is also divided into two semesters, called **Semester III** and **Semester IV**.
 - o The college shall hold examinations in **Winter** and **Summer** every year for both the even and odd semesters.
7. The regular examination of **Semester I** and **Semester III** shall be conducted in **Winter**, and the regular examination of **Semester II** and **Semester IV** shall be conducted in **Summer** every year.
 - o **Supplementary Examination** for Semester I and Semester III shall be held in **Summer**, and the supplementary examination for Semester II and Semester IV shall be held in **Winter** every year.
8. For the purpose of **instructions and examinations**, the student shall study **sequentially**.
9. The period of the academic session/term shall be such as may be **notified by this Autonomous College**.
10. The examinations, as given in Para 7 above, shall be held on such dates as may be **notified by this Autonomous College**.
11. **Subject to his/her compliance with the provisions of this rule and other rules pertaining to examinations in force from time to time, the applicant for admission at the end of the course of study of a particular term shall be eligible to appear for the examination if:**
 - (i) He/She has satisfied the conditions mentioned in the table and the provisions there under.
 - (ii) He/She has pursued a regular course of study in this college.
 - (iii) He/She has, in the opinion of the Head of the Department/Principal, shown satisfactory progress in his/her studies.

Semester wise Admission, Eligibility and NCRF Level

Sr. No.	Semester and NCRF Level	Type of Admission	Eligibility
1	M.C.A. Semester-I NCRF Level 6.5	Direct Admission	A person who has passed the three year degree of Bachelor of Science of any stream with CET of MH-State for that academic year.
2	M.C.A. Semester-II NCRF Level 6.5	Natural Growth	---
3	M.C.A. Semester-III NCRF Level 7.0	Natural Growth	Completed minimum 50% of total credits of major course plus 50% of total credits from remaining course categories of MCA Semester I and Semester II. OR Having four year UG honors degree or UG honors with research degree in similar Major from any Statutory University. OR Having PG Diploma in Major from any Statutory University.
4	M.C.A. Semester-IV NCRF Level 7.0	Natural Growth	---

General Examination Regulations for Master in Computer Application

12. The papers and practicals in which an examinee is to be examined, the maximum marks for these, and the minimum passing marks that an examinee must obtain in order to passing the subject and the examination shall be **as per the curriculum**.
13.
 - (i) The scope of the subjects is as indicated in the syllabus.
 - (ii) The medium of instruction and examinations shall be **English**.
14. There shall be **no classification** of examinee successful in **MCA Semester-I, MCA Semester- II, MCA Semester-III, and MCA Semester-IV** examinations separately.
15. Examinees who are successful as mentioned below:
 - a. Clearly passed in MCA Sem I, MCA Sem II, MCA Sem III, and MCA Sem IV.
 - b. Acquired UG Honors or UG Honors with Research Degree in Major and clearly passed in MCA Sem III and MCA Sem IV.
 - c. Acquired P.G. Diploma in Major and clearly passed in MCA Sem III and MCA Sem IV.
—shall be declared passed in MCA, and CGPA and programme grade will be computed as per the provisions and rules of examinations under CBCS for this autonomous college.
16. An examinee who does not pass or who fails to present himself/herself for the examinations shall be eligible for **re-admission** to the same examination, on payment of fresh fees and such other fees as may be prescribed.
17. As soon as possible after the examinations, the **Examination Committee** shall publish the **results** of the examinees.
The result of the final MCA examinations shall be declared as mentioned in Para-15 above, and the **merit list** shall be notified as per the rules.
18. Notwithstanding anything to the contrary in this rule, **no one shall be admitted to an examination** under this rule, if he/she has already passed the same examination or an **equivalent examination** of any statutory university.
19. (i) The examinees who have passed in all the subjects prescribed for all the examinations shall be eligible for the **award of the Degree of Master in Computer Application** by **S.G.B. Amravati University, Amravati**.
(ii) The **degree certificate** in the prescribed form will be signed by the **Honorable Vice- Chancellor** of **S.G.B. Amravati University, Amravati**.

Curriculum for **First Year MCA** (Programme Code MCA2025) Aligned As Per NEP2020 w.e.f. AY 2025-2026

Sr · No	Cours e Categ ory	Course Code	Course Name			Teaching Scheme				Examination Scheme													
							T U T O R I A L	P R A C T I C A L		Ho urs /W eek	Theory					Practical							
											Dur atio n of Exa m (Hrs)	Max Mark s Theo ry Pape rs	Max Mar ks Sess iona l		Min Pas s Ma rks	Dura tion of Exam (Hrs)	Ext ern al Ma rks	Sess iona l Mar ks		Min Pas s Ma rks			Gr and Tota l
Semester-I (NCRF Level 6.5)				Short Name	Credi ts	LEC TUR ES																	
1	Major	25MCA1F500	Problem Solving & Programming in Java	PSPJ	3	3			3	3	70	30	100	40									
2	Major	25MCA1F501	Data Structures & Algorithms	DSA	3	3			3	3	70	30	100	40									
3	Major	25MCA1F502	Database Management Systems	DBMS	3	3			3	3	70	30	100	40									
4	Major	25MCA1F503	Web Technologies	WT	3	3			3	3	70	30	100	40									
5	Major	25MCA1F504	Elective - I	EL I	3	3			3	3	70	30	100	40									
6	Major	25MCA1F505	Lab - 1: Based on PSPJ & DSA	LAB1	2			2	4						3	25	25	50	20				
7	Major	25MCA1F506	Lab - 2: Based on DBMS & WT	LAB2	2			2	4						3	25	25	50	20				
8	Major	25MCA1F507	Mini Project-1	PRJ1	2			2	4						3	25	25	50	20				
9	SEC	25SEC I	Business Communication & Organizational Behavior	BCOB	1	1			1								50	50	20				
			Total		22	16		6	28		350	150	500			75	125	200		700			
Semester-II (NCRF Level 6.5)																							
1	Major	25MCA2F508	Programing in Python	PP	3	3			3	3	70	30	100	40									
2	Major	25MCA2F509	Artificial Intelligence & Machine Learning	AIML	3	3			3	3	70	30	100	40									
3	Major	25MCA2F510	PHP and MySql Programming	PHP	3	3			3	3	70	30	100	40									
4	Major	25MCA2F511	Cloud Computing	CC	3	3			3	3	70	30	100	40									
5	Major	25MCA2F512	Elective - II	EL II	3	3			3	3	70	30	100	40									
6	Major	25MCA2F513	Lab - 3: Based on PP & AIML	LAB3	2			2	4						3	25	25	50	20				
7	Major	25MCA2F514	Lab - 4: Based on PHP & EL II	LAB4	2			2	4						3	25	25	50	20				
8	Major	25MCA2F515	Mini Project-2	PRJ2	2			2	4						3	25	25	50	20				
9	SEC	25SEC II	Skill Enhancement Course -II	SEC II	1	1			1								50	50	20				
			Total		22	16		6	28		350	150	500			75	125	200		700			

SEMESTER-I	
Elective Courses- I	
25MCA1F504	Basics of Linux and Shell Scripting (BLS)
25MCA1F504	Software Engineering(SE)
25MCA1F504	Computer Networks and Communication(CNC)

SEMESTER-II	
Elective Courses -II	
25MCA2F512	Cyber Security (CS)
25MCA2F512	Sports Data Modeling and Analytics (SDMA)
25MCA2F512	Natural Language Processing (NLP)

SEMESTER-I & II	
Skill Enhancement Course (SEC)	
25SEC II	Innovation & Entrepreneurship Development
25SEC II	Devops and CI-CD Automation (IED/DOP)

Note 1: 50% theory syllabus may be completed by subject teacher in the classroom teaching, 30% theory syllabus may be completed through online mode by the subject teacher and 20% syllabus may be completed with the help of professional outside experts from academia/industry/professional body through online/classroom teaching mode.

Note 2: 60% practical course may be completed by subject teacher in the laboratory or, 10% practical course may be completed through online mode using Virtual Labs and 30% using case study approach.

Note 3: Project report submission through online mode on college library portal with due approval of supervisor and Head of the Department, Project evaluation by presentation through online system/face-to-face interview method by the examiners.

Note 4: Courses to be learn through online mode shall be learn through UGC/AICTE recognized portals for online courses, and treated as completed on successful completion and submission of certificate to the college. The course shall be selected in consultation with nodal officer and approved by the committee. The evaluation shall be done by conducting examination by the external examiner through presentation/face-to-face interview/viva-voce.

Note 5: Students shall be divided into three groups depending on their percentage of marks in previous examination, Group 1: percentage more than 70%, Group 2: Percentage more than 55% and less than 70% and Group 3: Percentage less than 55%. These students shall be assessed internally using three different methods. Group 1: Based on online test and advanced study, Group 2: Based on written Class test and online test, Group 3: Based on Written Unit Test and assignments.

Note 6: Students should include similarity index report(Plagiarism Report) in project and/or seminar report of each semester.

Curriculum for **Second Year MCA** (Programme Code MCA2025) Aligned As Per NEP2020 w.e.f AY 2026-2027

Sr. No	Course Category	Course Code	Course Name	Short Name	Credit	Teaching Scheme				Examination Scheme										Grand Total
						LECTURES	TUTORIALS	PRACTICALS	Hours/Week	Theory					Practical					
										Duration of Exam (Hrs)	Max Marks Theory Papers	Max Marks Sessional	Total	Min Pass Marks	Duration of Exam (Hrs)	External Marks	Sessional Marks	Total	Min Pass Marks	
Semester-III(NCRF Level 7.0)																				
1	Major	25MCA3S600	Mobile Application Development	MAD	3	3			3	3	70	30	100	40						
2	Major	25MCA3S601	Internet of Things	IOT	3	3			3	3	70	30	100	40						
3	Major	25MCA3S602	Digital marketing	DM	3	3			3	3	70	30	100	40						
4	Major	25MCA3S603	Research Methodology	RM	2	2			2								50	50		
5	Major	25MCA3S604	Elective - III	EL III	3	3			3	3	70	30	100	40						
6	Major	25MCA3S605	Lab-5: Based on MAD (Using Flutter / React Native	LAB5	2			2	4						3	25	25	50	20	
7	Major	25MCA3S606	Lab-6: Based on IOT (Arduino/Raspberry Pi)	LAB6	2			2	4						3	25	25	50	20	
8	Major	25MCA3S607	Lab-7:Based on DM and EL III	LAB7	2			2	4						3	25	25	50	20	
9	Major	25MCA3S608	Major Project	PRJ3	2			2	4						3	25	25	50	20	
			Total		22	14		8	30		280	120	400			100	150	250		650
Semester-IV(NCRF Level 7.0)																				
1	Major	25MCA4S609	Internship	PRJ4	16				32						3	100	50	150	60	
2	Major	25MCA4S610	Seminar (Based On Online Technical course(S)	SEM	6				12						3	50	50	100	40	
			Total		22				44		0	0	0			150	100			250

SEMESTER-III**Elective Courses - III**

25MCA3S604 : Deep Learning (DL)

25MCA3S604 : Microsoft Azure (MA)

25MCA3S604 : Software Testing Techniques & Tools
(STT)

*** During 4th semester students shall complete one online course approved by the department and should submit completion certificate issued by competent authority**

*** External Marks of internship will be assessed on cumulative or monthly performance report of student submitted by industry/ company mentor to college internship mentor.**

Semester- I

Course Category	Major	
Course Code	25MCA1F500	
Course Name	Problem Solving & Programming in JAVA	
Course Short Name	PSPJ	
Total Lectures	45	
Total Credits	3	
Marks	External: 70	Internal: 30
Prerequisites:		
1. Basic knowledge of computers and operating systems 2. Understanding of fundamental programming concepts.		
Course Objectives:		
1. To learn basic features of JAVA and working of JVM. 2. To understand the concept of control statements. 3. To learn concepts of OOP 4. To learn event Handling and exception Handling 5. To learn creating packages in java and working of Applets.		
Mapping of Programme Outcomes: PO1, PO2		Mapping of Programme Specific Outcomes: PSO1, PSO2
Course Outcomes: After completing this course, The students will be able to: CO 1. Student will be able to understand Java basics and how to write and run a simple Java program. CO 2. Student will be able to apply OOP concepts in class design. CO 3. Student will be able to write reusable and modular Java code using inheritance and interfaces. CO 4. Understand JDBC architecture and will be able to create applications to communicate with SQL databases like oracle, mysql, etc. CO 5. Can develop server side applications and enterprise web applications using Java Servlet.		
Units	Contents	Total Lectures
I	Introduction to Java: Data types, types of variable(local, static, instance) Control statements: if, if-else, Nested if, Switch-case Statement, Looping Statement: for loop, for-each loop, while loop, do-while loop, break statement, continue statement, type casting, Array, Creating, Initializing, and Accessing an Arrays,static and dynamic binding, Access modifier.	9
	Mapping of COs: CO1	
II	OOP's Concept: class, object, inheritance, encapsulation, abstraction, polymorphism, method, method overloading, Argument passing, static keyword, final keyword, super keyword. Inheritance: types of inheritance, polymorphism, Run time polymorphism, method overriding, abstract, abstract method and classes,and interface. String functions.	9
	Mapping of COs: CO2	
III	Exception Handling: Introduction, pre-defined Exceptions, Try-Catch-Finally, throws, throw, User Defined Exceptions, creating packages, Socket and ServerSocket classes, URL class, displaying data of a web page, InetAddress class, DatagramSocket and DatagramPacket, Two way communication, Creating client server chat application using TCP Sockets, Creating client server chat application using UDP Sockets.	9
	Mapping of COs: CO3	
IV	JDBC Drivers, Steps to connect to the database, Connectivity with Oracle, Connectivity with MySQL, Connectivity with Access without DSN, DriverManager, Connection interface, Statement interface, ResultSet interface, PreparedStatement, ResultSetMetaData, DatabaseMetaData, Storing image, Retrieving image, Storing file, Retrieving file, Stored procedures and functions, Transaction Management, Batch Processing, scrollable and updatable resultset.	9
	Mapping of COs: CO4	

V	Servlets: Introduction, Web application Architecture, HTTP Protocol & HTTP Methods, Web Server & Web Container, Servlet Interface, HTTPServlet, GenericServlet, Servlet Life Cycle, ServletConfig, Servlet Context, Servlet Communication:Servlet-Browser Communication-send Error, setHeader, sendRedirect, Web-Component Communication-Forward, Include, JSP:Introduction, LifeCycle, JSP Scripting Elements:declaratives, scriptlets, expressions,Implicit Objects, JSP Directives: page, include, taglib,JSPStandard Actions: use Bean tag, setProperty tag, getProperty tag	9
	Mapping of COs CO5	
Text Books: 1. Java for beginners by Shirish Chavan 2. internet and Java Programming by R.Krishnamoorthy and S. Prabhu 3. Java: The Complete Reference, Seventh Edition - by Herbert Schildt ,McGraw Hill Education; 9th edition 4. JDBC API Tutorial and Reference (Java Series) -by Maydene Fisher , Jon Ellis, Jonathan Bruce, Addison Wesley; 3rd edition		
Reference Books: 1. Java: The Complete Reference, Seventh Edition - by Herbert Schildt , McGraw Hill Education; 9th edition		

Course Category	Major	
Course Code	25MCA1F501	
Course Name	Data Structures & Algorithms	
Course Short Name	DSA	
Total Lectures	45	
Total Credits	3	
Marks	External: 70	Internal: 30
Prerequisites:		
1. Basic Knowledge of C Language		
Course Objectives:		
1. To learn linear and non-linear data structures.		
2. To analyse, design and implement different data structure algorithms, sorting and searching mechanisms.		
3. To understand, analyse, design and implement different file formats, file organization methods.		
Mapping of Programme Outcomes: PO1, PO2		Mapping of Programme Specific Outcome: PSO1
Course Outcomes: After completing this course, The students will be able to:		
CO 1. Student will be able to understand, basic concept of data structure, file and algorithms, operations.		
CO 2. Student will be able to analyse, design and implement different data structure algorithms.		
CO 3. Student will be able to understand, analyses, design and implement searching and sorting techniques.		
CO 4. Student will be able to analyse, design and implement hierarchical data structures.		
CO 5. Student will be able to understand, analyse, design and implement different file formats, file organization methods.		
Units	Contents	Total Lectures
I	Introduction: Types of Data Structure: Linear & Nonlinear data structure, DS operations, algorithm, Complexity of algorithm, Abstract data types. Arrays: Linear Array, Memory Representation of linear Arrays, Operation on Linear Array, Multidimensional Arrays. Mapping of COs: CO1	9
II	Linked List: Linked List Representation, Types of Linked List: Simple Linked List, Doubly Linked List, Circular Linked List, Operations: Insert, Delete, Traversal Stacks: Introduction to Stack, Stack Representation, Operation on stack, Stack implementation using arrays and linked list, Stack's applications: Infix, Postfix & prefix expressions, Infix to Postfix conversation, evaluation of postfix expressions, Recursion. Mapping of COs: CO2	9
III	Queues: Introduction to queues, Primitive Operations on the Queues, Dqueue, Circular Queue, Priority Queues. Queue Application. Searching: Introduction to Searching & Sorting, linear search, binary search. Sorting: bubble sort, selection sort, insertion sort, Merge Sort. Mapping of COs: CO3	9
IV	Trees: Terminology and Concepts, Binary Tree, Representation, Linked representation of binary trees, Binary Search Tree, Operation on Binary search trees: Insert, Delete. Tree Traversals: Preorder, Inorder, Postorder, AVL Search Trees, B Trees, Application of Tree. Graphs: Terminology and Graph Representation: Adjacency matrix, Adjacency list, Traversals: Depth first and Breadth first, Minimum spanning tree, shortest path algorithm, topological ordering, Application of Graph. Mapping of COs: CO4	9
V	File Concepts: Files, Types of File: Master file, Transaction file, Work file, Text file, Binary file, Program file, File Processing Operation: open, close, read, write, seek. File Format: CSV, JSON, ascii text, Microsoft Excel, Audio-Video Interleave and ZIP. File Organization: Sequential organizations, Random organizations, Linked Organizations, Inverted files. Mapping of COs CO5	9
Text Books:		
1. Data structure by Seymour Lipschutz.		
2. Practical approach to Data structure and algorithm by Sanjay Pahuja.		
3. Sartaj Sahani, "Data structure algorithms and Application in C++", McGrawHill		

Reference Books:

1. Introduction to data structure with applications. By Tremblay & Sorenson.
2. Introduction to data structure by T.L Naps & Bhagat Singh.
3. Data management & file structure by Merry E.S. Loomis
4. Tanenbaum, Langsam, Augenstein, "Data structure using C", PHI S.B.Kishor,
5. "Data Structures" Maek Allan Weless,
6. "Data structure and algorithm analysis in C++", Addison Wesley

Course Category	Major	
Course Code	25MCA1F502	
Course Name	Database Management System	
Course Short Name	DBMS	
Total Lectures	45	
Total Credits	3	
Marks	External: 70	Internal: 30
Prerequisites:		
1. Basic knowledge about database and tables.		
Course Objectives:		
1. Explain fundamental database concepts and different DBMS architectures 2. Master SQL data definition, manipulation, control, and transaction control commands and apply integrity constraints. 3. Develop complex query skills using DQL select command 4. Implement PL/SQL modules—functions, procedures, cursors, triggers—for encapsulated logic. 5. Normalize relational schemas through normalization to minimize redundancy. 6. Equip students with the knowledge of advanced database security mechanisms and introduce modern NoSQL database concepts for handling diverse and scalable data systems.		
Mapping of Programme Outcomes: PO1, PO2		Mapping of Programme Specific Outcomes: PSO6
Course Outcomes: After completing this course, the students will be able to: CO 1. Compare file system and DBMS and understand various database system architectures. CO 2. Students will construct and execute SQL statements for schema and data management. Also able to apply integrity constraints. CO 3. Students will design and execute advanced SQL queries and views to retrieve meaningful business insights. CO 4. Students will write PL/SQL routines with proper use of cursors and triggers to enforce business rules and data integrity within the database. CO 5. Students will apply normalization techniques to analyze dependencies and decompose schemas into normal form structures. CO 6. Apply database security techniques and compare SQL with NoSQL systems, including the use of document-based databases like MongoDB for secure and scalable data management.		
Units	Contents	Total Lectures
I	Introduction to Database Concepts: File System VS DBMS, Purpose of Database systems, Database system application, Three-Schema Architecture and Data Independence, Database Environment. Database System Architectures: RDBMS, Centralized Database system, Server System Architecture and its transaction server architecture, Parallel Database Architecture, Distributed Systems, Cloud based services. Mapping of COs: CO1	10
II	SQL: Data Definition Language- Create, Alter, Drop, Truncate, Rename. Integrity Constraints in SQL. Data Manipulation Language- Insert, Update, Delete. Data Control Language: Grant and Revoke. Transaction Control Language- Commit, Rollback, Savepoint. Mapping of COs: CO2	8
III	Data Query Language: Select, Distinct, All, Arithmetic operators, Comparison operators & Logical operators, Rename operation, String Operations, Pattern matching with LIKE operator, Order by Clause, Between operator, Null values, Aggregate Functions, Group By, Having Clause, Nested Sub-queries, Joined relations, Set Operations, Set Membership, Set Comparison, Views. Mapping of COs: CO3	9
IV	PL/SQL: Function, Stored Procedure, Cursor, Trigger. Decomposition: Lossy and Lossless Decomposition, Normalization: First, Second, Third, Boyce-Codd, Fourth, Fifth, Domain - Key Normal Forms	8

	Mapping of COs: CO4, CO5	
V	Database Security: DB Security issues, Discretionary Access, mandatory access control and role-based access control for multi-level security, SQL injection. NoSQL database concepts: Introduction to NOSQL systems, Benefits of NoSQL, comparison between SQL and NoSQL database systems, Categories of NoSQL systems, Document – based NoSQL systems and MongoDB.	10
	Mapping of COs : CO6	
	Text Books: 1. Abraham Silberschatz, Henry F. Korth, S. Sudharsan, “Database System Concepts”, Sixth Edition, McGraw-Hill , 2011 2. Ramez Elmars, Shamkant B. Navathe, “Fundamentals of database System”, Seventh Edition, Person Education 2017.	
	Reference Books: 1. “SQL, PL/SQL: The Programming Language of Oracle” by Ivan Bayross – BPB Publications 2. Raghu Ramkrishnan, Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill, 2003 3. “Database Systems” by Thomas Connolly and Carolyn Begg , Fourth Edition	

Course Category	Major	
Course Code	25MCA1F503	
Course Name	Web Technologies	
Course Short Name	WT	
Total Lectures	45	
Total Credits	3	
Marks	External: 70	Internal: 30
Prerequisites:		
1. Basics knowledge of Computer system, Internet and editing tools.		
Course Objectives:		
1. To learn basics of Website		
2. To develop simple web pages.		
3. To learn and understand the CSS and create Styles for web pages.		
4. To learn and understand scripting and to write simple JavaScript.		
5. To learn and understand basics of JavaScript and to write simple JavaScript		
Mapping of Programme Outcomes: PO1, PO2		Mapping of Programme Specific Outcomes: PSO1, PSO2
Course Outcomes: After completing this course, the students will be able to:		
CO 1. To be able to develop simple web pages.		
CO 2. Knowledge and skill of Website designing and scripting.		
CO 3. Comfortably use CSS, JavaScript for developing advanced web sites		
CO 4. Understand and apply fundamental JavaScript concept and syntax		
CO 5. Use array, objects, and events for dynamic user interaction.		
CO 6. Manipulate the DOM and perform client-side form validation		
Units	Contents	Total Lectures
I	Web basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World-Wide-Web Consortium (W3C). W3C Standards. HTML5 : Features, Editing, HTML5 structure, Headings, Linking, Images, Lists, Tables, Forms. HTML5 New Elements: Form input type element: colors, date, time, e-mailaddress, numbers, range, search, telephone numbers, URLs, Datalist Elements . Mapping of COs: CO1	9
II	HTML 5 Page-Structure Elements: header, nav, figure, fig-caption, article, summary, details, section, aside, meter, footer, Audio & Video elements. CSS: Introduction, basic properties: text, list, border font, Selectors: universal, element, id, class, group. CSS types: Inline, Internal and External Style Sheets. Mapping of COs: CO2	9
III	Introduction to JavaScript :History and features, Client-side VS server-side JavaScript JavaScript placement :Inline, Internal, External, <script> tag and placement (head vs body) Variables and Data Types : var, let, const, Primitive types: string, number, Boolean ,null, undefined, Type conversion Operators: Arithmetic, assignment, comparison, logical, bitwise, ternary. Control Statements : if, if-- else, if-- else if and switch. Mapping of COs: CO3	9
IV	Looping Statements: for, while, do-while, for-in loop, for-of loop, break, continue Functions in JavaScript: Defining and Calling Functions, Function Expression, Arrow Functions, Parameter and return values. Events in JavaScript: onclick, onchange, onmouseover, Event Handling and Listeners. Recursion . JavaScript Objects: / Math, String, Date, Number and Boolean. Mapping of COs: CO4	9
V	Document Object Model (DOM): What is DOM. getElementById, getElementsByClassName, querySelector, innerHTML. Modifying attributes, text, styles dynamically. Browser Object model (BOM): window, navigator, location, history, screen. Alert, Confirm, Prompt boxes. Form Validation: Accessing form elements. Validating form fields: email, number, required. Preventing form submission. JavaScript Arrays: Creating arrays, Methods: push, pop, shift, unshift, splice, slice. Iterating arrays using for and forEach(). JavaScript Error Handling . Mapping of Cos: CO5,CO6	9

Text Books:

1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web:How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9
2. Thomas A. Powell, "HTML & CSS: The Complete Reference" , Fifth Edition,McGraw-Hill, ISBN: 978-0-07-174170-5

Reference Books:

1. Complete JavaScript Reference ,Thomas powell , MC Graw Hills

Course Category	Major	
Course Code	25MCA1F504	
Course Name	Basics of Linux and Shell Scripting	
Course Short Name	EL I	
Total Lectures	45	
Total Credits	3	
Marks	External: 70	Internal: 30
Prerequisites: 1. Basic knowledge of computer fundamentals 2. Familiarity with any programming language (preferably C or Python) 3. Understanding of operating system concepts		
Course Objectives: 1. Introduce students to the Linux operating system and its environment 2. Develop proficiency in using Linux commands and utilities 3. Enable students to automate tasks using shell scripting 4. Provide hands-on experience in writing, debugging, and executing shell scripts 5. Prepare students for real-world problem-solving using Linux and shell scripting tools		
Mapping of Programme Outcomes: PO1		Mapping of Programme Specific Outcomes: PSO7
Course Outcomes: After completing this course, The students will be able to: CO 1. Understand and navigate the Linux file system and environment. CO 2. Execute and manage Linux commands for daily tasks CO 3. Write, debug, and optimize shell scripts for process automation CO 4. Utilize advanced shell scripting features such as loops, conditionals, and functions CO 5. Develop project-based solutions using Linux and shell scripting		
Units	Contents	Total Lectures
I	Introduction to Operating System, Introduction to Linux , History and features of Linux, Overview of Linux distributions, Linux system architecture, Kernel, Shell, and File System, Logging in and basic navigation, Understanding the Linux desktop and terminal Mapping of COs: CO1	9
II	Working with the Linux File System, Linux file system structure (directories and files), Basic file and directory commands: ls, cd, pwd, mkdir, rmdir, File operations: cp, mv, rm, cat, more, less, Understanding file permissions and ownership, Viewing and changing permissions with chmod and chown Mapping of COs: CO2	9
III	Users, Processes, and Editors, User and group concepts, Switching users and managing passwords, Introduction to processes: viewing (ps, top), killing (kill) Introduction to text editors: nano and vi, Creating and editing files Mapping of COs: CO2	9
IV	Introduction to Shell, Types of Shells (e.g., Bash, Zsh, etc.), Shell Environment and Variables, Shell Configuration Files (.bashrc, .bash_profile) , Writing and Executing Shell Scripts, Variables and Data Types, Input/Output Redirection, Positional Parameters and Command-Line Arguments, Arithmetic Operations ,Conditional Statements: if, if-else, elif, case, Loops: for, while, until, Break and Continue Statements Mapping of COs: CO3	9
V	Defining and Calling Functions , Function Parameters and Return Values, File Handling in Shell Scripts, Regular Expressions and Pattern Matching ,Scheduling Jobs: cron and at, Debugging Shell Scripts (set -x, set -e), Linux system call Mapping of Cos: CO4, CO5	9
	Text Books: 1. Richard Petersen Linux The Complete Reference McGraw Hill, 6th edition 2. Richard Blum Linux command line and shell scripting Wiley India 3. Linux System Programming, Robert Love, O'Reilly, SPD.	
	Reference Books: 1. "A Practical Guide to Linux Commands, Editors, and Shell Programming": by Mark G. Sobell. 2. "Linux for Beginners": by Jason Cannon.	
Note: This syllabus is subject to change.		
Prg.Code:MCA2025		
MCA-Session(2025-2026)		
Pg.19		

Course Category		Major	
Course Code		25MCA1F504	
Course Name		Software Engineering	
Course Short Name		EL I	
Total Lectures		45	
Total Credits		3	
Marks		External: 70	Internal: 30
Prerequisites: 1. Basic concept of software program. 2. Basic project management concepts. 3. Logical and analytical thinking.			
Course Objectives: 1. To understand the software development life cycle and various process models. 2. To analyze and gather software requirements using standard methodologies. 3. To design software solutions applying architectural and design principles. 4. To introduce testing strategies, quality assurance, and maintenance techniques. 5. To emphasize project management techniques in software development.			
Mapping of Programme Outcomes: PO1, PO2, PO3		Mapping of Programme Specific Outcomes: PSO1, PSO4, PSO5	
Course Outcomes: After completing this course, The students will be able to: CO 1. Understand and compare software process models. CO 2. Apply requirements engineering techniques for software systems. CO 3. Design software architecture and apply modeling techniques. CO 4. Implement effective software testing and maintenance practices. CO 5. Apply project management practices to software development projects.			
Units	Contents		Total Lectures
I	Introduction to Software Engineering System, Characteristics of system, Types of system, Types of information system, Software, Software characteristics, Software process, Software development process, Definition and need of software engineering, SDLC, History and development of software development models, Waterfall model, Spiral model, V-model, Agile model and other models. RAD model incremental model, Iterative model, Prototype model.		9
	Mapping of COs: CO1		
II	Requirement in software process, Requirement analysis, Types of requirements, Steps in requirements analysis, Techniques for knowing user requirements, Requirements specification, Structure of software requirements specification (SRS) documents, Characteristics of good SRS, Role of system analysis, Requirement validation.		9
	Mapping of COs: CO2		
III	Process of software design, Top-down approach, Bottom-up approach, High level design entity, ER diagram, Data flow diagram, Data dictionary, Decision Tree and Decision Table, Flowchart, Pseudocode, UI design, I/O Design, UML Diagram, Software modularity, Coupling and Cohesion, Structure charts, Quality of design, Principles of Good Design..		9
	Mapping of COs: CO3		
IV	Coding: Programming Practices: Top-down and Bottom-up, Structured programming, Programming style, Code inspection and review, Unit testing. Metrics of coding: Size, Complexity, Style. Testing Fundamentals: Error, Failure and Bugs, Bug Lifecycle, Functional testing and Non-functional testing, Verification techniques, Validation Techniques: Levels of testing: Unit testing, Integration testing, System testing, Test cases, Automated testing..		9
	Mapping of COs: CO4		
V	Software maintenance, Types, Models, Techniques for software maintenance, Software Configuration management tools for software maintenance, Software Planning and scheduling, Responsibilities of project management, Risk management, Project plan, Project scheduling, Project staffing , Project cost estimation, Software Quality metrics		9
	Mapping of COs CO5		
Note: This syllabus is subject to change.		Prg.Code:MCA2025	MCA-Session(2025-2026)

Text Books:

1. Software Engineering Principles and Practices, 5th Ed., Rohit
2. Software Engineering: Concepts and Cases, Ashwini Renavikar

Reference Books:

1. *An Integrated Approach to Software Engineering*, Pankaj Jalote, Narosa Publishing.

Course Category	Major	
Course Code	25MCA1F504	
Course Name	Computer Networks And Communication	
Course Short Name	EL I	
Total Lectures	45	
Total Credits	03	
Marks	External: 70	Internal: 30
Prerequisites:		
1. Basic understanding of computer systems and operating systems.		
Course Objectives:		
1. To introduce fundamental concepts and types of computer networks and communication protocols.		
2. To analyse data link control, error detection, and flow control mechanisms.		
3. To study IP addressing, routing algorithms, and network layer functionalities.		
4. To understand the transport layer protocols and their role in reliable communication.		
5. To explore application layer protocols and network security fundamentals.		
Mapping of Programme Outcome: PO1, PO2		Mapping of Programme Specific Outcomes: PSO7
Course Outcomes: After completing this course, The students will be able to:		
CO 1. To introduce fundamental concepts and types of computer networks and communication protocols.		
CO 2. Analyse data link layer functions including framing, error detection, and MAC protocols		
CO 3. To study IP addressing, routing algorithms and network layer functionalities.		
CO 4. To understands the transport layer protocols and their role in reliable communication.		
CO 5. To explore application layer protocols and network security fundamentals		
Units	Contents	Total Lectures
I	Introduction to Computer Networks: Data communication components and types, Network types: LAN, MAN, WAN, Network topologies, Reference models: OSI and TCP/IP, Network devices: Hub, Switch, Router, Bridge, Gateway	9
	Mapping of COs: CO1	
II	Data Link Layer: Framing, error detection and correction (Parity, CRC, Hamming Code), Flow control mechanisms, Data link layer protocols: Stop-and-Wait, Go-Back-N, Selective Repeat, MAC protocols: ALOHA, CSMA/CD, CSMA/CA, Ethernet and IEEE 802.3	9
	Mapping of COs: CO2	
III	Network Layer: Network layer design issues and functions, IPv4 and IPv6 addressing, Subnetting and Supernetting, Routing algorithms: Distance Vector, Link State, Path Vector, ICMP, ARP, RARP protocols	9
	Mapping of COs: CO3	
IV	Transport Layer: Transport layer services, Multiplexing and DE multiplexing, TCP vs UDP, TCP flow control, error control, congestion control, Port addressing, sockets.	9
	Mapping of COs: CO4	
V	Application Layer and Network Security: Application protocols: DNS, FTP, HTTP, SMTP, SNMP, Basic network management concepts, Network security fundamentals, Cryptography: Symmetric and Asymmetric encryption, Secure communication protocols: SSL/TLS, IPsec, Firewalls and VPNs	9
	Mapping of Cos: CO5	
	Text Books: 1. Behrouz A. Forouzan, <i>Data Communications and Networking</i> , McGraw Hill 2. Andrew S. Tanenbaum, <i>Computer Networks</i> , Pearson	
	Reference Books: 1. James F. Kurose & Keith W. Ross, <i>Computer Networking: A Top-Down Approach</i> , Pearson 2. William Stallings, <i>Data and Computer Communications</i> , Pearson 3. William Stallings, <i>Cryptography and Network Security</i> , Pearson	

Course Category	Major	
Course Code	25MCA1F507	
Course Name	Mini Project -1	
Course Short Name	PRJI	
Total Lectures	60	
Total Credits	2	
Marks	External: 25	Internal: 25
Prerequisites		
1. Preliminary knowledge of software development process. 2. Knowledge about technology and application domain in which project will be developed. 3. Good knowledge of subject domain and Software Engineering.		
Course Objectives		
1. Enable students to identify real-life problems or research-based issues in the domain of computer applications and translate them into well-defined project objectives. 2. Develop students' ability to apply theoretical and technical knowledge gained during the MCA programme to design, develop, and deploy a software-based solution. 3. Foster skills in project management, teamwork, requirement analysis, software engineering, and development methodologies. 4. Encourage documentation and communication skills through structured reports, presentations, and user manuals. 5. Prepare students for professional roles by simulating a real-world software development environment involving problem-solving, innovation, and ethical practices.		
Mapping of Programme Outcomes: PO1, PO2		Mapping of Programme Specific Outcomes: PSO4, PSO5
Course Outcomes		
CO1: Identify and define real-world problems or research areas relevant to computer applications, and propose suitable solutions using appropriate software engineering principles.		
CO2: Apply theoretical knowledge and technical skills gained in the coursework to design, develop, and implement a software-based solution or prototype.		
CO3: Demonstrate effective use of programming tools, platforms, databases, and other technologies required for development.		
CO4: Practice collaborative teamwork, project planning, and time management through systematic execution of project phases.		
CO5: Develop professional documentation, including Software Requirements Specifications (SRS), system design, and user manuals, adhering to industry standards.		
CO6: Communicate technical information clearly and effectively through oral presentations and demonstrations of the project.		
Rules for Project Work:		
A student will be examined in the course "Project Work" as given below:		
1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a possibility for a distinct task and care should be taken to see the progress of individual. 2. Students should take guidance from a guide and prepare Project Report on "Project Work" in 2 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted. 3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, Navigation Diagrams, File designs, experimental setup and methodology. 4. The project report will be duly assessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department. 5. The project report should be prepared in format prescribed by the College, which also specifies the contents and methods of presentation.		
Format of Project Synopsis:		
Topic		
Introduction		
Technology Usage		
Name of students and their signatures		
Name of Guide and signature		

Note: Synopsis should be hand written**General Instruction Regarding Preparation of Project Report:****TYPING:**

- (a) The typing shall be standard 12 pts in double spacing using only
- (b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
- (c) Paper: A4 size Paper

COPIES:

Two hard-bind copies(As per format displayed here with) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVERPAGE:

PROJECT REPORT ON

NAME OF THE PROJECT BY

NAME OF STUDENT

GUIDED BY

NAME OF THE GUIDE

P.G. Department of Computer Science & Technology,
Degree College of Physical Education,
Shree H.V. P. Mandal, Amravati.

ACADEMIC SESSION

Report format for Application Development Projects:

1. Blank Page at beginning
2. Title Page
3. Certificate from Guide Acknowledgement
4. Index with printed Page Numbers

CHAPTER1 : INTRODUCTION

- 1.1 Existing System and Need for Software
- 1.2 Proposed System
- 1.3 Scope of Work
- 1.4 OperatingEnvironment– Hardware and Software

CHAPTER2 :ANALYSIS &DESIGN

- 2.1 User Requirements
- 2.2 Software Requirements
- 2.3 System Flow
- 2.4 Module Flow
- 2.5 Module Document
- 2.6 Input Document
- 2.7 Computational Method Document(If methods are used)
- 2.8 Output Document
- 2.9 Navigation Diagram (if website)
- 2.10 Data Flow Diagram(DFD) (if desktop application)
- 2.11 Functional Decomposition Diagram(FDD) (if desktop application)
- 2.12 Entity Relationship Diagram(ERD) (if desktop application)
- 2.13 Data Dictionary
- 2.14 Table Design
- 2.15 Menu Tree
- 2.16 Menu Screens
- 2.17 Input Screens
- 2.18 Report Formats
- 2.19 Pseudo codes(optional)
- 2.20 Test Procedures(optional)

CHAPTER 3:IMPLEMENTATION&RESULTS

- 3.1 Input Forms with Data
- 3.2 Output Reports with Data
- 3.3 Sample Code

CHAPTER4:CONCLUSION ANDFUTURESCOPE

- 4.1.Drawbacks and Limitations
- 4.2.Conclusion
- 4.3.Proposed Enhancements

REFERENCES

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Course Category	Skill Enhancement Course I	
Course Code	25SEC I	
Course Name	Business Communication and Organizational Behavior	
Course Short Name	BCOB	
Total Lectures	15	
Total Credits	1	
Marks	External: -	Internal: 50
Prerequisites: 1. Basic English Communication Skills. 2. Computer Literacy 3. Interpersonal Interaction Experience 4. Fundamentals of Human Behaviour (Desirable)		
Course Objectives: 1. To develop effective business communication skills, both verbal and non-verbal. 2. To understand individual and group behavior within organizational settings. 3. To analyse organizational structures and dynamics.		
Mapping of Programme Outcomes: PO3, PO5		Mapping of Programme Specific Outcomes: PSO8
Course Outcomes: After completing this course, The students will be able to: CO 1. Demonstrate effective business communication skills in various formats. CO 2. Analyse individual behavior and its impact on organizational performance. CO 3. Evaluate group dynamics and apply team-building strategies.		
Units	Contents	Total Lectures
I	Fundamentals of Business Communication: Definition and importance of business communication. Communication process and types (verbal, non-verbal, written, oral). Barriers to effective communication and overcoming them.	3
	Mapping of COs:	
II	The 7 Cs of effective communication. Listening skills and feedback mechanisms. Organizational Behaviour – Individual Level: Introduction to organizational behaviour (OB).	3
	Mapping of COs:	
III	Personality traits and their impact on behaviour. Perception and attribution in organizations. Motivation theories (Maslow, Herzberg, McGregor). Group formation, team roles, and conflict resolution.	3
	Mapping of COs:	
IV	Organizational Structure and Culture: Types of organizational structures (functional, divisional, matrix). Organizational culture and its components.	3
	Mapping of COs:	
V	Power and politics within organizations. Change management and organizational development. Stress management and coping strategies.	3
	Mapping of Cos:	
	Text Books: 3. Behrouz A. Forouzan, <i>Data Communications and Networking</i> , McGraw Hill 4. Andrew S. Tanenbaum, <i>Computer Networks</i> , Pearson	
	Reference Books: 4. James F. Kurose & Keith W. Ross, <i>Computer Networking: A Top-Down Approach</i> , Pearson 5. William Stallings, <i>Data and Computer Communications</i> , Pearson 6. William Stallings, <i>Cryptography and Network Security</i> , Pearson	