SCHEME & SYLLABUS

(Choice Based Credit System)
For

Master of Computer Applications

(w.e.f. Session 2016-17)

Syllabus (Session: 2016-2017)

Department of Computer Science & Application

RIMT UNIVERSITY, MANDIGOBINDGARH, PUNJAB

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SECTION 1
Vision & Mission of the University

VISION

To become one of the most preferred learning places and a centre of excellence to promote

and nurture future leaders who would facilitate the desired change in the society.

MISSION

- To impart teaching and learning through cutting-edge technologies supported by the world class infrastructure

- To empower and transform young minds into capable leaders and responsible citizens of India instilled with high ethical and moral values.

- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their social responsibilities.

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SECTION 2
Vision and Mission of the Department

VISION

Strives to groom students with diverse backgrounds into competitive software professionals with moral values and committed to build a vibrant nation.

MISSION

- To provide a strong theoretical and practical background across the computer science discipline with an emphasis on software development.

- To provide technical solutions in the field of Information technology to the local society.

- To provide need-based quality training in the field of Information Technology.

- To provide students with the tools to become productive, participating global citizens and life-long learners.

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SECTION 3

Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

PROGRAM EDUCATION OBJECTIVES (PEO)

PEO1	Demonstrate analytical and design skills including the ability to generate creative solutions and foster team-oriented professionalism through effective communication in their careers.
PEO2	Graduates would expertise in successful careers based on their understanding of formal and practical methods of application development using the concept of computer programming languages and design principles in national and international level.
PEO3	Exhibit the growth of the nation and society by implementing and acquiring knowledge of upliftment of health, safety and other societal issues.
PEO4	Implement their exhibiting critical thinking and problem- solving skills in professional practices or tackle social, technical and business challenges

PROGRAM OUTCOMES (PO)

Program Credits	**150**
Number of Semesters	Total 6 semester in 3 years
Program Outcomes(PO): on successful completion of this Program, the learner will be able to:	
PO1	*Disciplinary knowledge:* Apply the knowledge of mathematics, science, computing fundamentals, and a Computing specialization to the solution of complex problems.
PO2	*Problem analysis:* Identify, formulate, review research literature, and analyse complex computing problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.
PO3	*Design/development of solutions:* Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4	**_Conduct investigations of complex problems:_** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**_Modern tool usage:_** Create, select, and apply appropriate techniques, resources, and modern Computer Science and IT tools including prediction and modelling to complex computing activities with an understanding of the limitations.

PO6	**_The Computer professional and society:_** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional computing practice.
PO7	**_Environment and sustainability:_** Understand the impact of the professional computing solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**_Ethics:_** Apply ethical principles and commit to professional ethics and responsibilities and norms of the computing practice.
PO9	**_Individual and team work:_** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**_Communication:_** Communicate effectively on complex Computing activities with the Computer Science community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**_Project management and finance:_** Demonstrate knowledge and understanding of the Computer Science and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**_Lifelong learning:_** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

Program Specific Outcomes(PSO's): on successful completion of this Program, the learner will be able to:

PO1	**Knowledge of Computing Systems:** An ability to understand the principles and working of computer systems.
PO2	**Project Development Skills:** An ability to understand the structure and development methodologies of software systems.
PO3	**Software Development Skills:** Familiarity and practical competence with a broad range of programming language and open-source platforms.
PO4	**Mathematical Skills:** An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm.

SECTION 5

Curriculum / Scheme with Examination Grading Scheme

SEMESTER WISE SUMMARY OF THE PROGRAMME:
(MCA)

S. No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	33	700	26.5
2.	II	33	700	26.5
3	III	33	700	26.5
4	IV	33	700	26.5
5	V	32	600	24
6	VI	22	500	15
	Total	186	**3900**	**145**

EXAMINATION GRADING SCHEME

Marks Percentage Range	Grade	Grade Point	Qualitative Meaning
80-100	O	10	Outstanding
70-79	A+	9	Excellent
60-69	A	8	Very Good
55-59	B	7	Good
50-54	B	6	Above Average
45-49	C	5	Average
40-44	P	4	Fail
0-39	F	0	Fail
ABSENT	AB	0	Fail

Percentage Calculation: CGPA *10

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FIRST SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA1101	Fundamentals of Information Technology	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1102	Programming in C	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1103	Discrete Mathematics	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1104	Communication and Soft Skills	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1105	System Analysis & Design	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1106	Practical-I (MS-Office)	-	-	4	2	4	60	40	100	3 Hrs
MCA1107	Practical-II (C Language)	-	-	4	2	4	60	40	100	3 Hrs
Total					26.5	33			**700**	

SECOND SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA1201	Object Oriented Programming Using C++	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1202	Internet and Web Designing	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1203	Principles & Practices of Management	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1204	Software Engineering	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1205	Basic Accounting	4	1	-	4.5	5	40	60	100	3 Hrs
MCA1206	Practical-III (C++)	-	-	4	2	4	60	40	100	3 Hrs
MCA1207	Practical-IV (HTML and DHTML)	-	-	4	2	4	60	40	100	3 Hrs
Total					26.5	33			**700**	

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THIRD SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA2301	Database Management System	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2302	Operating system and Concepts	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2303	Computer Organization and Architecture	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2304	Management Information System	4	1	-	4.5	5	60	40	100	3 Hrs
MCA2305	Elective I	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2306	Practical-V (DBMS)	-	-	4	2	4	60	40	100	3 Hrs
MCA2307	Practical – IV (Linux)	-	-	4	2	4	60	40	100	3 Hrs
Total					26.5	33			**700**	

FOURTH SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA2401	Java Programming	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2402	System Software	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2403	Data warehousing and mining	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2404	Interactive Computer Graphics	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2405	Elective II	4	1	-	4.5	5	40	60	100	3 Hrs
MCA2406	Practical – VII (Java)	-	-	4	2	4	60	40	100	3 Hrs
MCA2407	Practical VIII– (Graphics using C++)	-	-	4	2	4	60	40	100	3 Hrs
Total					26.5	33			**700**	

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FIFTH SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA3501	Data Structure	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3502	Advance Database Management System	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3503	Artificial Intelligence	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3504	Elective III	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3505	Major Project Ph I	-	-	4	2	4	60	40	100	3 Hrs
MCA3506	Software Lab -IX(Data Structure)	-	-	4	2	4	60	40	100	3 Hrs
MCA3507	Software Lab (Advance DBMS)	-	-	4	2	4	60	40	100	3 Hrs
Total					24	32			**700**	

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SIXTH SEMESTER

Course		Contact Hours/Week			Credit	Contact Hrs.	Evaluation Scheme (% of Total Marks)			Exam Duration (Hours)
Course Code	Course Title	L	T	P			Internal	External	Total	
MCA3601	Emerging Trends and Technologies	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3602	Advance Web Development	4	1	-	4.5	5	40	60	100	3 Hrs
MCA3603	Practical – XI (Advance Web Development)	-	-	4	2	4	40	60	100	3 Hrs
MCA3604	Project Phase II	-	-	4	2	4	60	40	100	3 Hrs
MCA3605	Project Training	-	-	4	2	4	60	40	100	3 Hrs
Total					15	22			**500**	

SECTION 1
Detailed Syllabus with Course Outcomes

SYLLABUS
SEMESTER-I

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NAME OF DEPT.**:**   **School of Computer Application**

Course Title: **Fundamentals of Information Technology**

1. Subject Code**:**   **MCA1101**

2. Contact Hours: **L: 4   T: 1   P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 1 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To This course will enable the student to gain an understanding of the core concepts and technologies which constitute Information Technology

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Computer Fundamentals: Block structure of a computer, characteristics of computers, generation of computers, classification of computers. Number System: Bit, byte, binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, Binary Arithmetic: Addition, subtraction and multiplication. Representation of Information: Integer and floating point representation, Complement schemes, Character codes (ASCII, EBCDIC, BCD, Excess-3, Grey).	10
2	**Section II** Block Diagram of Computer system, Various components of computers: Hardware, storage devices and media, Memory and its Organization, input-output devices, data communication equipment. Software – system software, application software. Programming languages: classification, machine code, assembly language, higher level language, and fourth generation languages	10
3	**Section III**	10

	Operating system: Batch, multi-programming, time sharing, mmultiprocessing, PC operating system, network operating system, on-line and real time operating system. Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media, network protocol, (TCP/IP.) Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting.	
4	**Section IV** Range of application: Scientific, Business, educational, weather forecasting, and remote sensing, planning, multilingual applications, management information, decision support system, inventory control, medical, industrial control, banks, railways, etc.	10
5	*Outcome of the subject* *The intention is for the student to be able to articulate and demonstrate a basic understanding of the fundamental concepts of Information Technology.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Rajaraman, Fundamentals of Computers, Fourth edition, Prentice Hall India Pvt. Limited, 2006.	2006.
2	Computer Fundamental, P.K Sinha, 4th Edition, BPB PUBLICATION 2007.	2007
3	Computers, Larry long & Nancy long, 12th edition, Prentice Hall, 2005.	2005

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1. Subject Code**:**   **MCA1102**   Course Title**:** **Programming in C**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 1 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The course is aimed to develop problem-solving strategies, techniques and
    skills that can be applied to computers and problems in other areas which give
    students an introduction to computer and enhance their analytical skills.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Program and Programming Language, History of C, Salient Features of C, Structure of a C Program, Writing and compiling a Simple C Program, Syntax and Semantic Errors, Execution Process . Character Set, Identifiers and Keywords, Rules for Forming Identifiers, Data Types and Storage, Data Type Qualifiers, Variables, Constants, enum Assignment Statements, Arithmetic Operators, Relational Operators, Logical Operators, Comma and Conditional Operators, Type Cast Operator, Size of Operator, Priority of Operators	10
2	**Section II** Decision Control Statements- if, if-else, if -elseif, switch Statement, Loop Control Statements- While, do-while, for, Nested Loop, Goto Statement, Break Statement, Continue Statement Array Declaration, Array Initialization-Initialization of Array Elements in the Declaration, Character Array Initialization, Subscript, Processing the one dimensional Array, 2D Arrays- Declaration , Initialization and	10

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	processing, Multi-Dimensional Array Declaration, Initialization and processing, Declaration and Initialization of Strings, Display of Strings Using Different Formatting Techniques, Array of Strings, Built-in String Functions and Applications Functions : Definition of a Function, Declaration of a Function, Function Prototypes, Return Statement, Types of Function Invoking- Call by Value and Call by reference, Recursion, Macros vs Functions Storage Classes- Automatic, External, Static, Register	
3	**Section III** Declaration of Structures, Accessing the Members of a Structure, Initializing Structures, Structures as Function Arguments, Structures and Arrays Unions-Initializing an Union, Accessing the Members of an Union Pointers and their Characteristics, Address and Indirection Operators, Pointer Type Declaration and Assignment-Pointer to a Pointer, Null Pointer Assignment, Pointer Arithmetic, Passing Pointers to Functions Arrays and Pointers, Array of Pointers, Pointers and Strings	10
4	**Section IV** C Preprocessor like define, include, ifdef , Other Preprocessor Commands. File Handling in C Using File Pointers, input and Output using file pointers, Sequential Vs Random Access Files	10
5	*Outcome of the subject* *Students will learn to write algorithm for solutions to various real-life problems and converting them into computer programs using C language.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Balagurusamy, "Programming in C", 5th Edition, Tata McGraw-Hill Education, 2007	2007.
2	Yashavant Kanetkar, "Let us C", 10th Edition, BPB publication, 2010	2010
3	Kerighan & Richie The C programming language (PHI Publication)	

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1. Subject Code**:**   **MCA1103**   Course Title: **Discrete Mathematic cs**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 1 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To provide basic knowledge about mathematical structures required for various computer science courses.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets. Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.	10
2	**Section II** Group and Subgroup: Group axioms, Semi groups, Subgroups, Abelian group, Cosets, Normal subgroups, cyclic groups, Permutation Groups, Rings and Fields: definition and standard results, Representation of special languages and grammars, finite state machines.	10
3	**Section III** Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered	10

	set, properties of Lattices, and complemented lattices. Boolean Algebra: Basic definitions, Sum of Products and Product of Sums, Form in Boolean Algebra, Logic gates and Karnaugh maps, Applications(Switching circuits, Gate circuits).	
4	**Section IV** Graphs: Simple graph, multi graph, Directed and undirected graphs, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.	10
5	*Outcome of the subject* *After the completion, student will be able to understand and find out the way to solve the problems.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Trambley, J.P. and Manohar,R: Discrete Mathematical Structures with Applications to Computer Science.	
2	Liu C.L.: Elements of Discrete Mathematics.	
3	Alan Doerr and Kenneth Levasseur: Applied Discrete Structures for Computer Science.	
4	Narsingh Deo: Graph Theory.	

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Course Title: **Communication
and Soft Skills**

1. Subject Code**:**   **MCA1104**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory**   **0** **3**   **Practical** **0** **0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0** **4.5**   6. Semester   **1**

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of this course is to make students understand that both oral & written
Communications are equally important.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Basics of Technical Communication- Functions of Communication- Internal & External Functions, Models-Shannon & Weaver's model of communication, Flow, Networks and Importance, Barriers to Communication, Essential of effective communication (7 C's and Other principles), Non-verbal Communication.	10
2	**Section II** Basic Technical Writing: Paragraph writing (descriptive, Imaginative etc.), precise writing, Reading and comprehension, Letters – Format & various types.	10

3	**Section III** Verbal Communication- Presentation Techniques, Interviews, Group Discussions, Extempore, Meetings and Conferences.	10

4	**Section IV** Technical Communication-Dissertation and Thesis, Technical Reports, Instruction Manuals and Technical Descriptions, Creating Indexes.	10
5	*Outcome of the subject* *The students should be comfortable with both Verbal & written communication.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Loveleen Kaur, "Communication Skills", Satya Pratashan Publication, Edition 2008.	2008
2	M Aihraj Rizvi," Effective Technical Communication", Tata McGraw hill, Edition 2005.	2005
3	Varinder Kumar Bodhraj, "Business Communication", Kalyani Publishers", Edition 2011.	2011
4	S.P. Dhanavel, "English and Communication Skills for Students of Science and Engineering" Orient BlackSwan Publication, 2009	2009

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Course Title: **System Analysis & Design**

1. Subject Code**:**   **MCA1105**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 1 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To teach the analysis and practicality of various systems on which software system can be developed.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** System Definition and concepts: General Theory systems, Manual and automated systems, Real-life Business Sub-Systems, System Environments and Boundaries. Realtime and distributed systems, Basic principles of successful systems, Approach to system development: Structured System Analysis and Design, Prototype, Joint Application Development. Role and Need of Systems Analyst, Qualifications and responsibilities, System Analysis as a Profession	10

2	**Section II** Introduction to Systems Development Life Cycle (SDLC), Various phases of SDLC: Study, Analysis, Design, Development, Implementation, Maintenance, Systems documentation consideration: Principles of Systems Documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization. Data and fact gathering techniques: Interviews, Group Communication-Questionnaires, Presentation & Site Visits, Assessing Project Feasibility: Technical, Operational, Economic, Cost Benefits Analysis,	10

	Schedule, Legal and contractual, Political. l\1odem Methods for determining system requirements: Joint Application Development Program, Prototyping, Business Process Re-engineering. System Selection Plan and Proposal. Module specifications, Top-down and bottom-up design, Module coupling and cohesion, Structure Charts.	
3	**Section III** Process modeling, Logical and physical design, Conceptual Data Modeling, Entity Relationship Analysis, Entity Relationship Modeling, ERDs and DFDs, Concepts of Normalization, Process Descriptions, Structured English, Decision tree, Decision tables, Documentation: Data dictionary, Recording Data Descriptions. Classification of forms, Input/output forms design, User interface design, Graphical interfaces, Standards and guidelines for GUI design, Designing Physical Files and Databases: Designing fields, Designing Physical Records, Designing Physical Files, Designing Databases. Introduction to CASE Tools, Features, Advantages and Limitations of CASE Tools,	10
4	**Section IV** Planning considerations, Conversion methods, procedures and controls, System acceptance criteria, System Evaluation and Performance, Testing and Validation, Preparing User Manual, Maintenance Activities and Issues. Introduction to UML, OO Development Life Cycle and Modeling, Static and dynamic modeling, Comparison of OO and Module-oriented Approach, Modeling using UML. Audit of Computer System Usage, Types of Threats to Computer System and Control Measures: Threat and Risk Analysis, Disaster Recovery and Contingency Planning, Viruses.	10
5	*Outcome of the subject* *After completing this course students will be able to design and develop systems.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	System Analysis and Design Awad Elias N. Second Edition, Galgotia Publications	
2	Analysis and Design of Information System Sen James A. Second Edition, Tata McGraw Hill.	

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Course Title: **Practical-I**
(MS-Office)

1. Subject Code**:**   **MCA1106**

2. Contact Hours: **L: -**   **T: -**   **P: 4**

3. Examination Duration (Hrs.):   **Theory** | 0 | 0 | **Practical** | 0 | 3 |

4. Relative Weight**:**   **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | 0 | 2 | 6. Semester | 1 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To teach the techniques used in MS Office: MS WORD, MS EXCEL & MS POWERPOINT.

10. Details of the Course:

This laboratory course will mainly comprise of exercises on use MS Office: MS WORD, MS EXCEL & MS POWERPOINT. Practical file needs to be maintained.

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Course Title: **Practical-II**
(C Language)

1. Subject Code**:**   **MCA1107**

2. Contact Hours: **L: -**   **T: -**   **P: 4**

3. Examination Duration (Hrs.):   **Theory** | 0 | 0 | **Practical** | 0 | 3 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 2 | 6. Semester | 1 |

7. Pre-requisite: _____

8.   Subject Area: _____

9.   Objective: The course is aimed to develop the skills that can be applied to create and develop the C programs.

10. Details of the Course:

This laboratory course will mainly comprise of programs on all the concepts covered in MCA1102.

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SECTION 2
Detailed Syllabus with Course Outcomes

SYLLABUS
SEMESTER-2

Program Name: Master of Computer Applications
Program Code: CA 401

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Course Title: **Object Oriented**
Programming
Using C++

1. Subject Code**:**   **MCA1201**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | 4.5 | 6. Semester | 2 |

7.   Pre-requisite: _____

8.   Subject Area: _____

9.   Objective: To give students' the exposure to basic concepts of object-oriented technology. It will help in learning to write programs in C++ using object-oriented paradigm. Approach in this Course is to take C++ as a language that is used as a primary tool in many different areas of programming work.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Object Oriented vs Procedural Languages, Object Oriented Concepts: Data abstraction, encapsulation, Classes and objects, modularity, hierarchy, concurrency, persistence, Polymorphism, Inheritance. Tokens, Expressions, Operators & Control Structures. Scope Resolution operator, member de-referencing operator, Reference Variables	10
2	**Section II** Defining a class, its member and member functions, Objects, accessing class Members. Access specifiers – public, private, and protected Classes, its members, objects and memory allocation, static data & member function, constant parameters & member functions, friend functions & friend classes, role of constructors & destructors, dynamic objects, operator overloading, function overloading.	10

3	**Section III** Inheritance in C++: Derivation Rules, Single Inheritance, Multiple Inheritance, Hierarchical Inheritance, Multilevel Inheritance, Roles of constructors and destructors in inheritance.	10

	Run-time Polymorphism in C++: Virtual functions and their needs, Pure virtual function, virtual derivation and its need, abstract class.	
4	**Section IV** File stream classes, ASCII & Binary files, sequential & random access to a file	10
5	*Outcome of the subject* *Students will be able to understand the benefits of Object oriented approach and write solutions for various problems in OOPs approach.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publications, 1994	1994.
2	C++ Programming Language, Bjarne Wesley Publications, 1994.	1994
3	Object Oriented Software Engineering, S.Halladay and M. Wiebel, BPB Publications, 1995.	1995
4	Object Oriented Programming with C++, E.Balagurusamy, Tata McGraw Hill	

Program Name: Master of Computer Applications
Program Code: CA 401

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Course Title: **Internet and Web Designing**

1. Subject Code**:**   **MCA1202**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | 4.5 | 6. Semester | 2 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: This course is designed to make the student understand the basics of the internet
    and its working. Also students can gather the knowledge of the very basics websites
    and their working.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Overview of Internet, history, web system architecture. What Special About Internet, Dial Up Connection/Direct Connection; Slip Or PPP, Domain Name System: Name for Machine, Flat Name Space, Hierarchical Names Internet Domain Names, Domain Name Revolution, Transmission Control Protocol/Internet Protocol (TCP/IP), FTP, HTTP, SMTP, WAIS (Wide Area Information Service), TELNET, Internet Addressing, IP Address, IPv4, IPv6, Electronic Mail Address, E-Mail Basic, WWW: The Client Site, Server Site, Uniform Resource Locator, HTTP protocol basics, HTTP request & response, Cookies Basics	10

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2	**Section II** Basic HTML and tags, Language description, usability, static creation of HTML web pages.Creating tables, forms and their advantages. Web Authoring using HTML; Creating a Web page, Methods of Linking, Publishing HTML, Text formatting and Alignment, Font Control, Arranging text in lists, Images on a Web page, Backgrounds and Color Control, Interactive Layout with Frames.	10
3	**Section III**	10

	What is DHTML? Style sheets, their advantages and interaction with scripting language. Java script objects and events, cookies, Difference Between HTML And DHTML, ECOM And Portal	
4	**Section IV** Introduction to ASP technology. How to create dynamic web pages. Under standing ASP objects model, processing data using session variables. What is the purpose of global as a file. Data base connectivity through ADO's.	10
5	*Outcome of the subject* *After the successful completion of the subject student will be able to design and launch websites.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Internetworking With TCP/IP Vol-I Third Edition (Phi) By Douglas E. Comer	
2	Mastering HTML 4.0 BPB: D.S. Ray	
3	Java Script: R. Allenwyke	
4	Asp In 21 Days	
5	. Internet For Every One: Leon And Leon	

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Course Title: **Principles & Practices of Management**

1. Subject Code**:** **MCA1203**

2. Contact Hours: **L: 4** **T: 1** **P: -**

3. Examination Duration (Hrs.): **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:** **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | **0** | 4.5 | 6. Semester | 2 |

10. Pre-requisite: _____

11. Subject Area: _____

12. Objective: This course presents a thorough and systematic coverage of management theory and practice and aims to provide the fundamental knowledge and exposure of the concepts, theories and practices in the field of management. It focuses on the basic roles, skills and functions of management, with special attention to managerial responsibility for effective and efficient achievement of goals.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to management: Definition and Nature of management, Functions of management and manager. Management: Science or art, Levels of management, Fayol's general principles of management. Planning: Nature and purpose of planning, Planning versus forecasting, Types of plans, Steps in planning, Planning process.	10
2	**Section II** Decision making: characteristics and importance, programmed and non-programmed decisions, Steps in the process of decision making. Organizing: Concept, Nature, Purpose and Process of Organizing, formal and informal organizations. Span of Management: Meaning, factors determining an effective span. Departmentation: Need and Importance, Bases of Departmentation. Concept of Delegation and its importance, Factors affecting delegation.	10

3	**Section III**	10
	Staffing: Definition, Manpower Planning, Process of Staffing. Brief	

	introduction to the concept of Recruitment and Selection. Motivation: Need and Role of Motivation, Types of Motivation/Motivators. Theories of Motivation: Maslow's hierarchy of needs theory, Herzberg's Hygiene theory, McClelland theory. Leadership: Definition and Characteristics, Leadership Theories: Trait approach to leadership, Behavioural approach, Situational or Contingency approach to leadership. Leadership styles: Autocratic style, Democratic style, Paternalistic approach, Laissez faire.	
4	**Section IV** Communication: Meaning, Characteristics, Importance. Elements of communication, the communication process, Types of communication, Formal and Informal Communication. Barriers and breakdowns in Communication, Making Communication Effective. Controlling: Nature and significance of controlling, Basic Control Process.	10
5	*Outcome of the subject* *After the completion of the course student will understand the need of management and its role at various times and stages. This will be very useful if he/ she will be an entrepreneur*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	L. M. Prasad, Principles & Practice of Management. Sultan Chand & Sons.	
2	Koontz H. and Weihrich H., Essentials of Management, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 12th Edition.	
3	Stoner J., Management, Prentice-Hall of India Ltd., New Delhi, 6th Edition.	

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1. Subject Code**:**   **MCA1204**   Course Title: **Software Engineering**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   -

3. Examination Duration (Hrs.):   **Theory   0   3   Practical   0   0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0** 4.5   6. Semester   2

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of the course is to help the students to get conceptual knowledge required for various methods. Model used under software development process as well as new techniques.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Software and Software Engineering, Software characteristics, Software crisis, Software Engineering paradigms. Planning a software project -Software cost estimation, project scheduling, personnel planning, team structure.	10
2	**Section II** Software configuration management, quality assurance, project monitoring, risk management. Software requirement analysis -structured analysis, object oriented analysis and data modeling, software requirement specification, validation.	10
3	**Section III** Design and implementation of software -software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control, coding. Software reliability -metric and specification, fault avoidance and tolerance, exception handling, defensive programming.	10
4	**Section IV** Testing -Testing fundamentals, white box and black box testing,	10

	software testing strategies: unit testing, integration testing, Validation testing, System testing, debugging. Software maintenance - maintenance characteristics, maintainability, maintenance tasks, maintenance side effects. CASE tools.	
5	*Outcome of the subject* *This would help in optimizing the whole software development process.*	
6.	**Total**	40

11. Suggested Books:

| SI. No.	Name of Books / Authors	Year of Publication
1.	Roger. S. Pressman, Software Engineering - A Practitioner's Approach, 7th Edition, McGraw Hill, 2010.	2010
2	Rajib Mall, "Fundamental of Software Engineering ", 3rd edition, PHI, 2009.	2009
3	Naseeb Singh Gill, "Software Engineering: Software reliability, testing and quality, Khanna Book Publishing, 2011.	2011

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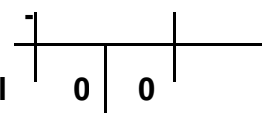1. Subject Code**:**   **MCA1205**   Course Title: **Basic Accounting**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   -
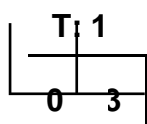
3. Examination Duration (Hrs.):   **Theory**   **0**   **3**   **Practical**   **0**   **0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0**   **4.5**   6. Semester   2

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To provide an overview of theoretical and practical concepts of Accounting.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Accounting: Principles, concepts and conventions, double entry system of accounting, introduction to basic books of accounts of sole proprietary concern, partnership, organization & company, closing of books of accounts and preparation of trial balance. Final Accounts: Trading, Profit and Loss accounts and Balance sheet (without adjustment)	10
2	**Section II** Financial Management: Meaning, scope and role, a brief study of functional areas of financial management. Introduction to various FM tools: Ratio Analysis, Fund Flow statement and cash flow statement (without adjustments)	10
3	**Section III** Costing: Nature, importance and basic principles, Marginal costing: Nature scope and importance, Break even analysis, its uses and limitations, construction of break even chart, Standard costing: Nature, scope and variances, Budgetary Control (only introduction)	10
4	**Section IV**	10

	Computerized Accounting: Advantages, Computer Programs for accounting, Computer based Auditing.	
5	*Outcome of the subject* *After the successful completion of the course student will be able to study, understand, and create the ledgers. Student will also be able to manage the finances and computrized tools to handle them.*	
6.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Principles: A Book-Keeping by J.C.Katyal ☐☐	
2	Principles of Accounting by Jain and Narang,.	
3	Financial Management by I.M.Pandey, Vikas Publications	
4	Management Accounting, by Sharma, Gupta & Bhall	
5	Cost Accounting by Jain and Narang ☐☐	
6	Cost Accounting by Katyal,.	
7	Basic Accounting, Second Edition by Rajni Sofat, Preeti Hiro, PHI	

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1. Subject Code**:**   **MCA1206**   Course Title: **Practical-III (C++)**

2. Contact Hours: **L: -**   **T: -**   **P:**   **4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | | **EPE** | |

5. Credits**:** | **0** | **2** | 6. Semester | 2 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To give students' the exposure to write programs in C++ using object-oriented
          paradigm. Approach in this Course is to take C++ as a language that is used as a
          primary tool in many different areas of programming work.

10. Details of the Course: This laboratory course will mainly comprise of programs on all the
      concepts covered in MCA1201.

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1. Subject Code**:**   **MCA1207**   Course Title: **Practical-IV (HTML and DHTML)**

2. Contact Hours: **L: -**   **T: -**   **P: 4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3**

4. Relative Weight**:**   **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | **0** | **2** | 6. Semester | **2** |

11. Pre-requisite: _____

12. Subject Area: _____

13. Objective: This course is designed to make the student understand the basics of the internet and its working. Also students can gather the knowledge of the very basics websites and their working.

14. Details of the Course: This laboratory course will mainly comprise of programs on all the concepts covered in MCA1202.

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SECTION 3
Detailed Syllabus with Course Outcomes

SYLLABUS
SEMESTER-3

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Course Title: **Database Managemen System**

1. Subject Code**:**   **MCA2301**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 3 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of this course is to help the students to get knowledge about databases its architecture various models.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction: Database Approach, Characteristics of a Database Approach, Database System Environment. Roles in Database Environment: Database Administrators, Database Designers, End Users, Application Developers. Database Management Systems: Definition, Characteristics, Advantages of Using DBMS Approach, Classification of DBMSs. Architecture: Data Models, Database Schema and Instance, Three Schema Architecture, Data Independence – Physical and Logical data Independence. Database Conceptual Modelling by E-R model: Concepts, Entities and Entity Sets, Attributes, Mapping Constraints, E-R Diagram, Weak Entity Sets, Strong Entity Sets. Enhanced E-R Modelling: Aggregation, Generalization, Converting ER Diagrams to Tables.	13
2	**Section II** Relational Data Model: Concepts and Terminology, Characteristics of Relations.	13

	Constraints: Integrity Constraints- Entity and Referential Integrity constraints, Keys- Super Keys, Candidate Keys, Primary Keys, Secondary Keys and Foreign Keys. Relational Algebra: Basic Operations, Additional Operations, Example Queries. Relational Calculus: Tuple and Domain Relational Calculus, Example Queries. Database Design: Informal Design Guidelines for Relation Schemas, Problems of Bad Database Design, Normalization: Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms– 1NF, 2NF, 3NF, BCNF, Multi-valued Dependency, Join Dependency and Higher Normal Forms- 4NF, 5NF.	
3	**Section III** Database Protection: Security Issues, Discretionary Access Control-Granting and Revoking Privileges, Mandatory Access Control and Rule Based Access Control. Database Concurrency: Problems of Concurrent Databases, Serializability and Recoverability, Concurrency Control Methods-Two Phase Locking, Time Stamping, Multi-version Time Stamping, Database Recovery: Recovery Concepts, Recovery Techniques-Deferred Update, Immediate Update, Shadow Paging. Brief overview of the following: Distributed Databases, Data Mining, Data Warehousing and OLAP, Mobile Databases, Multimedia Databases, Deductive Databases, Temporal Database, Spatial Database.	14
4	***Outcome of the subject*** *After the completion of the course student will easily relate the role DBMS in their day-to-day life. Also they will be able to handle the database*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Elmasry, Navathe, "Fundamentals of Database System", Pearson Education.	
2	Henry F. Korth, ASilberschhatz, "Database Concepts," Tata McGraw Hill.	
3	C.J. Date ," An Introduction to Database Systems", Pearson Education.	
4	Oracle SQL Complete Reference", Tata McGrawHill.	
5	Thomas Connolly, Carolyn Begg, "Database Systems", Pearson Education.	

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Course Title: **Operating system and Concepts**

1. Subject Code**:** **MCA2302**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 3 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To understand the concepts and components of system programming and to learn the fundamentals of Operating System including dealing with deadlocks and file management

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction : Evolution of operating systems, operating system concepts and structure, types of operating systems. CPU Scheduling : Scheduling concepts, CPU scheduling algorithms, Algorithm evaluation.	13
2	**Section II** Memory Management: Memory management without swapping or paging, swapping, overlapped swapping, paging, Segmentation, Virtual memory concepts, Demand paging, Page replacement algorithms, Thrashing. File Systems : File concepts, Access methods, Allocation methods, Directory systems, File protection	13

3	**Section III** Disk scheduling : Disk scheduling algorithms, selecting a disk scheduling algorithm, System Dead Locks : The dead lock problem, Dead lock characterization, Dead lock Prevention, Dead lock avoidance, Dead lock detection, Recovery from deadlock	14
4	*Outcome of the subject*	

	Student will be aware of Process Management, Memory Management, File Management and I/O Management in detail, which will be useful to them for Large Application Development	
5.	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Peterson james Land Silberscharz A., "Operating Systems Concepts",Addison-Wesley.	
2	Galvin, "Operating System".	

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Course Title: **Computer Organization and Architecture**

1. Subject Code**:**   **MCA2303**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory**   **0   3**   **Practical**   **0 | 0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0 | 4.5**   6. Semester   3

10. Pre-requisite: _____

11. Subject Area: _____

12. Objective: The objective of the course is to provide students with a solid foundation and knowledge of computer design. Examine the operation of the major building blocks of a computer system. To introduce students to the design and organization of the various components and their relationship between hardware and software and focusing on the concepts that are the basis of the current computers such as microprocessors.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Basic Electronics: Combinational circuits- half and full adder/subtractor, parallel adder, Multiplexers, Demultiplexers, Decoders, Encoders. Sequential circuits- concept, flip-flops (RS, JK, JK-Master-Slave, D, T), counters (Asynchronous, Synchronous) Mod-3, Mod-5, Decade Counter. Computer organization: Structure of Computer, Instruction codes, Instruction formats, Instruction cycle, Addressing modes	13
2	**Section II** Basic computer Organisation and design: Register Transfer language & operations, various Arithmetic, Logic & Shift microoperations instructions, codes, computer registers, instructions, timing & control, instruction cycle, design of a complete basic computer, Machine & Assembly Language, hardwired & Micro-programmed control unit, Design of a control unit.	13
3	**Section III**	14

	CPU Architecture: General register & stack organization, instruction formats and addressing modes, ALU & Control unit architecture. Memory Organization: Memory hierarchy, main, auxiliary, cache memory, virtual memory paging and segmentation. I/O Organization: Peripheral Devices, input-output interface, Modes of data transfer programmed & interrupt initiated I/O, DMA.	
4	**Outcome of the subject** *Successful completion of the course will provide students a comprehensive understanding of computer organization and its architecture and enable him/her analyze the movements of data and control signals.*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Morris Mano: Computer System Architecture, PHI.	
2	Hayes J.P.: Computer Architecture & Organisation, McGraw Hill.	
3	Stone: Introduction to Computer Architecture: Galgotia	
4	Tanenbaum: Structured Computer Organisation, PHI.	
5	Malvino, Brown: Digital Computer Electronics, TMH	

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Course Title: **Management Information System**

1. Subject Code**:**   **MCA2304**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 3 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of this course is to introduce the students to the Management Information Systems and its application in organizations. The course would expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in Management Information Systems.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to systems and Basic systems concepts, Types of systems, The systems Approach, Information systems: Definition and characteristics, types of Information, role of Information in Decision – Making, Sub – systems of information systems: EDP and MIS, management levels, EDP/MIS/DSS	13
2	**Section II** An overview of Management Information System: Definition and Characteristics, Components of MIS, Frame Work understanding MIS: Robert Anthony's Hierarchy of Management Activity. Information requirements and Levels of Management, Simon's Model of decision – Making, structured Vs unstructured decisions, Formal Vs. Information systems	13

3	**Section III** Developing Information systems: Analysis and design of information systems: Implementation and evaluation, Pitfalls in MIS development.	14
4	*Outcome of the subject* *At the end of the course, it is expected that students are able to understand the usage of Information Systems in management. The students also would understand the activities that are undertaken in acquiring an Information System in an organization. Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of* *these technology solutions in any organization.*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	J. Kanter," Management Information Systems", PHL.	
2	Goirden B. Davis & M.H.Olsca " Management Information Systems: Conceptual Foundation, Structure and Development:	
3	Robert G. Murdick & Joel E. Ross & James R. Claggett, " Information Systems for Modern Management", PHI.	
4	Lucas, "Analysis, Design & Implementation of Information system".	

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Course Title: **Practical-V (DBMS)**

1. Subject Code**:**   **MCA2306**

2. Contact Hours: **L: -**   **T: -**   **P: 4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3** |

4. Relative Weight**:**   **CWA**☐ **LWA**☐ **MTE**☐ **ETE**☐ **EPE**☐

5. Credits**:** | **0** | **2** | 6. Semester | 3 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of this course is to help the students to get knowledge about databases its architecture various models.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Exercise on Introduction to DBMS. Exercsise on introduction to SQL and DDL commands. Exercise on introduction DML commands. Exercise on introduction to DCL commands. Exercise on creation and modification of table.	13
2	**Section II** Exercise on Quering the table using select command Exercise on using function provided by database package. Study on using various types of joins. Study on WHERE CLAUSE and GROUP BY. Study on UNION and INTERSECTION.	13
3	**Section III** Exercise on HAVING CLAUSE.	14

	Exercise on different CONSTRAINTS and CHECK CONSTRAINTS. To understand use and working of Sub-queries. Exercise on COMMIT and ROLLBACK..	
4	*Outcome of the subject* *This laboratory course will mainly comprise of exercises on all the concepts covered in MCA- 2301 .Practical file must be maintained accordingly.*	
5.	**Total**	40

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Course Title: **Practical – IV**
(Linux)

1. Subject Code**:**   **MCA2307**

2. Contact Hours: **L: -**   **T: -**   **P:**   **4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3** |

4. Relative Weight**:**   CWA| | LWA| | MTE| | ETE| | EPE| |

5. Credits**:** | **0** | **2** | 6. Semester | **3** |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: This laboratory course will mainly comprise of exercises on all the concepts related to the Installation of the OS, Drivers, Managing Various Services, Users, Privileges, Packages, Files, Directories, Process, protection, Security.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Exercise on Introduction to LINUX operating system and its file system. Exercise on installation of LINUX operating system. Study of General purpose utilities commands. Study of file system navigation commands. Study on shells used in linux.	13
2	**Section II** Study on User and session commands. Exercise on to change file permissions. Study of VI Editor. Study of Shell Script. Exercise on execution of C and C++ programs in linux.	13
3	**Section III** Exercise on pipe and filter Commands.	14

	Exercise on Linux other commands part – 1. Exercise on Linux other commands part – 2. Exercise on Linux other commands part – 3. Exercise in expression commands.	
4	***Outcome of the subject*** *This laboratory course will mainly comprise of exercises on all the concepts covered in MCA- 2302 .Practical file must be maintained accordingly.*	
5.	**Total**	40

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Course Title: **Data Communication and Networks**

1. Subject Code**:** **MCA2305A**

2. Contact Hours: **L: 4** **T: 1** **P:** **-**

3. Examination Duration (Hrs.): **Theory** **0** **3** **Practical** **0** **0**

4. Relative Weight**:** **CWA** **LWA** **MTE** **ETE** **EPE**

5. Credits**:** **0** **4.5** 6. Semester **3**

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of the course is to help the students to get conceptual knowledge of all the networking basics along with various techniques used for communication between networks.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to data communication, analog Vs Digital Communication, Synchronous and Asynchronous communication, Error detection and correction; nature of errors, parity check, CRC, hamming code, Modulation; Multiplexing: SDM, FDM, TDM, STDM.	13
2	**Section II** Introduction to computer networks and application; network hardware, network software, OSI reference model, TCP/IP model, network standardization, physical layer: circuit switching, packet switching, message switching, modems, connections, transmission media.	13

3	**Section III**	
	Data link layer: design issues, elementary data link protocols-sliding window protocol, HDLC/SDLC, ALOHA, CSMA/CD, token passing, Network layer: design issues, Routing algorithms: shortest path routing, flooding, distance vector routing, flow based routing. Transport layer: design issues, elements of transport protocol, addressing establishing & releasing a connection, flow control & buffering	14
4	*Outcome of the subject*	

	This would help students to develop a secure network with various methods which they have been studying.	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Andrew S. Tanenbaum, "Computer Networks", 3rd Edition, Pearson Prentice Ltd. 2010.	2010
2	Behruoz A Forouzan, "Data Communication and Networking"4th Edition, Tata McGraw Hill, 2009.	2009
3	Larry L.Peterson, "Computer Networks: A System Approach", 4th Edition, Elsevier Publication,2008.	2008

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Course Title: **Microprocessor and it Applications**

1. Subject Code**:**   **MCA2305B**

2. Contact Hours: **L: 4**   **T: 1**   **P:**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** |

5. Credits**:** | **0** | **4.5** | 6. Semester | 3 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To make students aware about the internal architecture of microprocessors and give the basic knowledge about the assembly level language programming.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Microprocessors: Historical Background of Microprocessors, Various areas of applications of Microprocessors, Introduction to 8085, Architecture of 8085, Description of various pins	13
2	**Section II** Instruction Cycle, Timing Diagram, Addressing Modes of 8085 microprocessor Instruction Set, Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Branch Instructions, Control Instructions. Differences between 8085 and 8086 Microprocessor: Architecture and Configuration of the 8086/8088 microprocessor for minimum and maximum mode	13
3	**Section III** 8255A Programmable Peripherals Interface (PPI), Introduction and Architecture of DMA Controller8257, Architecture of Programmable Interrupt Controller 8259.	14

4	*Outcome of the subject* *After studying this subject students will be able to understand the architecture of microprocessors and the various controllers used with it*	

	to enhance the performance of computer system. Students will be able to write assembly level programs for hardware interfacing.	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Microprocessor Architecture, Programming and Applications with 8085, Ramesh. S. Gaonkar, Fourth Edition, Penram International Publishing	
2	Fundamentals of Microprocessors and Microcomputers, B. Ram, Fourth Edition, Dhanpat Rai Publications	
3	The Intel Microprocessors 8086/8088,80186/80188, 80286, 80386, 80486, Pentium Pro Architecture, Programming and Interfacing, B. Brey, Fifth Edition, Prentice Hall International.	
4	Walter Triebel: The 8086 Microprocessor - Architecture, Software and Interfacing Techniques, PHI, Delhi.	
5	Douglas V. Hall: Microprocessors and Interfacing - Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.	
6	Peter Abel: IBM PC Assembly Language and Programming, PHI, Delhi.	

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SECTION 4
Detailed Syllabus with Course Outcomes

SYLLABUS
SEMESTER-4

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Course Title: **Java Programming**

1. Subject Code**:**   **MCA2401**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory**   **0**   **3**   **Practical**   **0**   **0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0**   **4.5**   6. Semester   4

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, the students should be able to create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections; implement error-handling techniques using exception handling, create and event-driven GUI using Swing components; and implement I/O functionality to read from and write to text files.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Java: Features of JAVA, Data Types, Wrapper Types, Variables, Arrays, Operators-Arithmetic, Bit-Wise, Relational, Boolean, Various Control Statements. Introduction to Classes: Class Fundamentals, Declaring Objects, Methods, Constructor, Garbage Collection, Passing Parameters to Methods, Recursion, Access Control, Static, Final and Finally Method.	13
2	**Section II** Inheritance, Super, Multilevel Hierarchy, Abstract Methods and Classes, Packages and Interfaces, Importing Packages, Exception Handling. Exception Types, Try, Catch, Finally, Throw and Throws, Creating Exception Subclasses.	13
3	**Section III**	14

	Input/output Streams, Reading and Writing Console Input/output, Reading and Writing Files, Difference between JAVA and C++, Wrapper Classes Applets: Basics, Architecture, Skeleton, Simple Applet Display Methods, Repainting, HTML, APPLET Tag, Passing Parameters to Applets.	
4	***Outcome of the subject*** *Students will be able to understand the need of platform independence in todays environment and write programs for solutions to various real-life problems using the object oriented approach and JAVA language.*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Patrick Naughton and Herbert Schildt, The Complete Reference JAVA 2, Tata McGraw Hill	
2	JAVA Programming Language, Third Edition by Ken Arnold, James Gosling, David Holmes. Pearson Publications.	
3	E. Balagurusamy, "Programming with JAVA",Tata McGraw Hill.	

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Course Title: **System Software**

1. Subject Code**:**   **MCA2402**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** [ ]   **LWA** [ ]   **MTE** [ ]   **ETE** [ ]   **EPE** [ ]

5. Credits**:** | 0 | 4.5 | 6. Semester | 4 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To have an understanding of foundations of design of assemblers, loaders, linkers, and macro processors.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to System Software, Translators, loaders, interpreters, compiler, assemblers. Assemblers: Overview of assembly process, design of one pass and two assemblers. Macro Preprocessors: Macro definition and expansion, macro parameters, conditional macro expansion, Nested macro expansion, Design of Macro Preprocessor.	13
2	**Section II** Compilers: Phases of compilation process, Lexical analysis, Syntax Analysis, parsing, Chomsky Grammars, Code optimization, Intermediate code forms, cross compilers. Interpreters and its types	13
3	**Section III** Loaders and Linkers: Basic loader functions, various loading schemes, Relocation, program linking, linkage editors, text editors, Linking and its concepts.	14
4	*Outcome of the subject*	

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	Successful completion of the course will make the students clear about the various roles of system software and its basics	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Leland L. Beck : System Software, An introduction to system programming, AddisonWesley.	
2	. D.M. Dhamdhere : Introduction to System Software, Tata McGraw Hill.	
3	D.M. Dhamdhere : System Software and Operating System, Tata McGraw Hill, 1992.	1992
4	Compiler Design ,Ulman and Aho.	

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Course Title: **Data warehousing and mining**

1. Subject Code**:**   **MCA2403**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 4 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To introduce the concept of Data Warehousing and study in detail about the various components of the Data warehouse.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Review of Data Warehouse: Need for data warehouse, Big data, Data Pre-Processing, Three tier architecture; MDDM and its schemas, Introduction to Spatial Data warehouse, Architecture of Spatial Systems, Spatial: Objects, data types, reference systems; Topological Relationships, Conceptual Models for Spatial Data, Implementation Models for Spatial Data, Spatial Levels, Hierarchies and Measures Spatial Fact Relationships.	13
2	**Section II** Introduction to temporal Data warehouse: General Concepts, Temporality Data Types, Synchronization and Relationships, Temporal Extension of the Multi Dimensional Model, Temporal Support for Levels, Temporal Hierarchies, Fact Relationships, Measures, Conceptual Models for Temporal Data Warehouses : Logical Representation and Temporal Granularity	13

3	**Section III** Introduction to Data Mining functionalities, Mining different kind of data, Pattern/Context based Data Mining, Bayesian Classification: Bayes theorem, Bayesian belief networks Naive Bayesian classification, Introduction to classification by Back propagation and its algorithm,	14

	Other classification methods: k-Nearest Neighbor, case based reasoning, Genetic algorithms, rough set approach, Fuzzy set approach Introduction to prediction: linear and multiple regression, Clustering: types of data in cluster analysis: interval scaled variables, Binary variables, Nominal, ordinal, and Ratio-scaled variables	
4	*Outcome of the subject* *After the completion of the course the student will be aware of the need of Dataware housing in today's perspective and the various techniques to make it more effective according to the need of the organization.*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Data Mining: Concepts and Techniques By J.Han and M. Kamber, Publisher Morgan Kaufmann Publishers	
2	Advanced Data warehouse Design (from conventional to spatial and temporal applications) by Elzbieta Malinowski and Esteban Zimányi, Publisher Springer	
3	Modern Data Warehousing, Mining and Visualization By George M Marakas, Publisher Pearson	

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Course Title: **Interactive Computer Graphics**

1. Subject Code**:**   **MCA2404**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical**   **0** | **0**

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | **4** |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The aim is to introduce the students to key concepts of Computer Graphics like display devices, co-ordinate system, transformations, line and circle drawing, pointing, positioning, projections, etc.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Display Devices : Line and point plotting systems, Raster, vector, pixel and point plotters, Continual Refresh and storage displays, Digital frame buffer, Plasma panel displays, Display processors, Character generators, Colour display techniques : shadow mask and penetration CRT, Colour look-up tables, hard-copy colour printers.	10
2	**Section II** Display Description: Screen co-ordinates, user co-ordinates, use of homogeneous coordinates, Display code generation, Graphical functions, the view algorithm, Two-dimensional transformation, Line-drawing, Circle drawing algorithms.	10
3	**Section III** Interactive Graphics: Pointing and positioning devices (cursor, light pen, digitizing tablet, the mouse, track balls), Interactive graphical techniques, Positioning, (Elastic or Rubber Band lines, Linking, zooming, panning, clipping,	10

	windowing, scissoring), Mouse Programming. 3-D Graphics: Wire-frame, perspective display, perspective depth, Projective transformations, Hidden line and surface elimination (Black face removal algorithm).	
4	**Section IV** Turbo-C Graphic Language: Primitives (constants, actions, operators, variables), Plotting and geometric transformations, Display subroutines, Concept of Animation, Saving, Loading and Printing graphics images from/to disk, Animated algorithms for Sorting, Towers of Hanoi. Open GL: Primitives of the language and interface with C/C++.	10
4	*Outcome of the subject* *Students will be able to interpret the 2D and 3D visual information.* *Also they will gain proficiency in computer graphics API programming*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Giloi, W.K., 1978: Interactive Computer Graphics, Prentice-Hall.	
2	Newman, W., Sproul, R.F., 1980: Principles of Interactive Computer Graphics, McGraw-Hill.	1980
3	Rogers, D.F., 1985: Procedural Elements for Computer Graphics, McGraw-Hill.	1985
4	Harrington, S., 1983: Computer Graphics: A Programming Approach, Tata McGraw-Hill.	1983
5	Foley, J.D., Van Dam A., 1982: Fundamentals of Interactive Computer Graphics, Addison-Wesley.	1982
6	Hearn, D., Baker, P.M., 1986: Computer Graphics, Prentice-Hall.	1986
7	Tosijasu, L.K., 1983: Computer Graphics, Springer-Verlag.	1983
8	Kelley Bootle: Mastering Turbo C. Galgotia.	
9	Plastock, Roy, 1986: Theory & Problems of Computer Graphics, Schaum Series, Tata McGraw Hill.	1986

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Course Title: **E-Commerce**

1. Subject Code**:**   **MCA2405A**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 4 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The aim is to introduce the students to key concepts of Computer Graphics like display devices, co-ordinate system, transformations, line and circle drawing, pointing, positioning, projections, etc.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Electronic Commerce, Potential benefits & limitations of E-Commerce, Traditional Commerce vs. E-Commerce vs M- Commerce, Different E-Commerce Models (B2B, B2C, C2C, P2P), E- Commerce applications, Social Networks, Auctions & Portals, Legal and Ethical issues in E-Commerce	13
2	**Section II** Introduction to Electronic Data Interchange, Types of EDI, Benefits of EDI, Overview of Electronic Payment system, Types of Electronic payment schemes (Credit cards, Debit cards, Smart cards, Internet banking), Issues in Electronic payment systems Web Based Marketing and Communications: Online Advertising, E-Mail Marketing, Online Catalogs, Social Marketing and Targeted Marketing, Techniques and Strategies	13
3	**Section III** WWW concepts, Client/Server Computing, Web Servers and Clients, Web Browsers, A Systematic approach to Website creation, Creating interactive and dynamic web pages, Factors in E-Commerce Website design, Web and Database integration, Website Optimization strategies	14

	E-Commerce security, threats, managing security issues through internet security protocols and s tandards, and Firewall. Review of HTML, HTML tags; text formatting; text styles; lists: ordered, unordered and definition lists; layouts; adding graphics; tables; linking documents; images as hyperlinks; frames and layers; data collection using forms	
4	***Outcome of the subject*** *After the completion of the course student will have adequate knowledge about client server computing, e commerce and its benefits. Also student will be able to design and handle e-commerce websites*	
5.	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	E-Commerce Essentials by Kenneth Laudon and Carol Traver – Pearson Publication	
2	Frontiers of Electronic Commerce by Ravi Kalakota, Andrew B.Whinston - Addison Wesley Publication	
3	E-Commerce, Fundamentals and Applications by Henry Chan, Raymond Lee, Tharam Dillon and Elizabeth Chang - Wiley India Publication	
4	Web Enabled Commercial Application Development Using HTML, ,JavaScript, DHTML and PHP by Ivan Bayross BPB Publication	

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Course Title: **Image Processing**

1. Subject Code**: MCA2405B**

2. Contact Hours: **L: 4   T: 1   P:** -

3. Examination Duration (Hrs.): **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:** **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | 0 | 4.5 | 6. Semester | 4 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: Image processing is an advanced course offered as elective to students interested in learning the theory, techniques and applications of the subject. It also aims to stimulate interest in current research areas in image processing and in developing tools for use in research as well as in multimedia applications

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Image Processing : Digital Image Processing, Elements of Image Processing Systems—Image Acquisition, Processing, Communication, Display. Digital Image Fundamentals : Uniform and Non-uniform Sampling and Quantization, Basic Relationships between pixels—Neighbours of a pixel, Connectivity, Distance Measures, Imaging Geometry—Perspective transformations, Camera Model, Stereo Imaging.	13
2	**Section II** Image Transforms : Introduction to Fourier Transform, Discrete Fourier Transform, Properties of the Two – Dimensional Fourier Transform, The Fast Fourier Transform (FFT), Inverse FFT, Walsh, Hadamard and Discrete Cosine Transforms. Image Enhancement : Histogram Processing, Image Averaging, Smoothing Filters, Sharpening Filters, Low Pass and High Pass Filtering,	13
3	**Section III** Image Restoration : Degradation Model, Circulant and Non-circulant Matrices, Algebraic Approach to Restoration, Inverse Filtering.	14

	Image Compression : Fundamentals, Image Compression models, Low Compression, Image Compressions standards. Image Segmentation :Detection of Discontinuities, Edge Linking and Boundary Detection, Hough Transform, Thresholding , Region Oriented Segmentation.	
4	*Outcome of the subject* *After the successful completion of the course Student can very well understand the storage process, handling and editing of images*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Gonzalez & Woods : Digital Image Processing, Pearson Publishing Company Ltd.	
2	Jain , Anil K. : Fundamentals of Digital Image Processing, Pearson.	
3	Jensen, John R. : Introductory Digital Image Processing, Prentice Hall.	
4	Dougherty, Edward R. : Image Processing Digital Techniques.	

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1. Subject Code**:**   **MCA2406**   Course Title: **Practical Java**

2. Contact Hours: **L: -**   **T: -**   **P:**   **4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3**

4. Relative Weight**:**   **CWA** | **LWA** | **MTE** | **ETE** | **EPE**

5. Credits**:** | **0** | **2** | 6. Semester | **4**

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: The objective of this course is to ensure the students about the implementation of various concepts studied under MCA 2401

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	This laboratory course will mainly comprise of exercises on all the concepts covered in MCA2401. Practical file must be maintained accordingly	40
2	*Outcome of the subject* *Students will be able to implement the various concepts studied under MCA 2401*	
3.	**Total**	40

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Course Title: **Practical Graphics**
1. Subject Code**:**   **MCA2407**   **Using C++**

Objective: The objective of this course is to ensure that student have a very clear understanding
the difference between the graphics and normal programming with a practical knowledge.
Implementation of graphics will be done using the language like C/C++.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	1. Use of basic functions of graphic available in C++ like circle, putpixel, rectangle, arc, ellipse, floodfill, setcolor etc. 2. Use of basic primitive functions to show some animations. 3. Line Drawing Algorithm like Direct method, DDA and Bresenham's line algorithms. 4. Draw a circle using polynomial, trigonometry method and Bresenham's Algorithm. 5. Draw an ellipse using Bresenham's Algorithm. 6. To move a character along circle. To show 2D Clipping and Windowing.	40
2	*Outcome of the subject* *Practical applications of graphics, Program development and basic animations without using graphical softwares*	
3.	**Total**	40

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1.   **SEMESTER** 4TH

Subject Code**:**   **MCA3501**   Course Title: **Data Structure**

Objective: The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.

7. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Linear and non-linear data structures. Arrays, Array Operations: traversing, insertion, deletion, Merging two arrays; Sorting Techniques: Bubble sort, Selection sort, Radix sort, Memory Representation of one and multidimensional arrays in memory Stack, Stack Operations: traversal, pop, push, Queue , Queue operations : Traversal, insertion, deletion, Circular queues	13
2	**Section II** Linked Lists: Introduction, sequential vs linked representation, Operations: traversal, creation, insertion, deletion; circular linked lists and doubly linked lists; Fundamental concepts of dynamic memory allocation and garbage collection. Stack : Sequential and linked memory representations, Applications of stack: polish notation, infix to post fix , evaluating post fix expression; Definition of recursion and its applications Queues: Sequential and linked memory representation.	13
3	**Section III** Trees: Terminology, Types: Binary tree, Complete binary tree, Binary search tree, Memory Representation of binary trees: sequential and linked representation, Binary search tree Operations: Insertion and Deletion	14

	Binary tree Traversal techniques: inorder, pre-order, post order; BST operations: traversal ,searching, insertion, deletion. Graphs sequential and linked memory representation; Searching techniques in graphs: DFS, BFS,	

4	*Outcome of the subject* *After the completion of the course the student will be able to understand the need and implementation of various data structures. Also he/she will be able to relate them to the real world.*	
5.	**Total**	40

8. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Lipschutz, Seymour, 1986: Theory & problems of data structures, Schaum Series.	1986
2	Horwitz, E., and Sahni, S., 2003: Fundamentals of data structures, Computer Science Press.	2003
3	Tremblay, 2002: An introduction to data structures with applications, Tata McGraw.	2002
4	Aho, A. V., Hopcroft, and Ullman, J.E., 1982: Data structures and algorithms, Addison Wesley.	1982
5	Tanenbaum, A. M. and Augenstein, M.J., 1985: Data structures using C, Prentice Hall International.	1985
6	Deshpanday: C and data structures, Wiley India Pvt. Ltd	
7	Berman, A. Michael, 2002: Data structure via C++, Oxford University Press.	2002
8	Boldwins, Douglas: Algorithms and data structures: The science of computing, Wiley India Pvt. Ltd.	

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Course Title: **Advance Database Management System**

1. Subject Code**:**   **MCA3502**

2. Contact Hours: **L: 4**   **T: 1**   **P: -**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 5 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To study the further database techniques beyond which were covered earlier in the course, and thus to acquaint the students with some relatively advanced issues. At the end of the course students should be able to: gain an awareness of the basic issues in objected oriented data models, learn about the Web-DBMS integration technology and XML for Internet database applications, familiarize with the data-warehousing and data-mining techniques and other advanced topics.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** OODBMBS & ORDBMS: Overview of Object-Oriented concepts & characteristics, Objects, Database design for ORDBMS, Comparing RDBMS, OODBMS & ORDBMS Advance Database Management System – Concepts & Architecture: Spatial data management, Web based systems, Overview of client server architecture, Databases and web architecture, N-tier Architecture, Multimedia databases, Mobile database	13
2	**Section II** Distributed Databases: Introduction, DDBMS architectures, Homogeneous and Heterogeneous Databases, Distributed data storage, Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems	13
3	**Section III** Data Warehousing: Introduction to Data warehousing, Architecture, OLAP and data cubes Operations on cubes, Data preprocessing -need	14

	for preprocessing, data cleaning, data integration and transformation, data reduction Data Mining: Introduction to data mining, Introduction to machine learning, Process of Data Mining, Descriptive and predictive data mining, outlier analysis, clustering – k means algorithm, Classification - decision tree, association rules - apriori algorithm, Introduction to text rnining.	
4	***Outcome of the subject*** *Upon the completion of the subject, students will be able to understand the new developments in database technology, the impact of emerging database standards.*	
5.	**Total**	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Database system concepts'*, 5th Edition –by Abraham Silberschatz, Henry Korth, S,Sudarshan, (McGraw Hill International)	
2	Data Mining: Concepts and systems'*, by Jiawei nan, Micheline Kamber, (MorganKaufmann publishers)	
3	Database systems : "Design implementation and management", by Rob Coronel, 4th Edition, (Thomson Learning Press)	
4	Database Management Systems by Raghu Ramkrishnan, Johannes Gehrke Second Edition, (McGraw Hill International)	
5	Database Management System by Alexis Leaon, Mathews Leon, (leon press)	

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1. Subject Code**:**   **MCA3503**   Course Title: **Artificial Intelligence**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | **5** |

10. Pre-requisite: _____

11. Subject Area: _____

12. Objective: The objective of this course is to familiarize students with concepts of AI, its tools & technologies.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction to Artificial Intelligence (AI) and Problem Space : Introduction AI technique, Turing test, History and developments in AI, applications of AI, State space representation, production systems, systematic control strategies : Breadth first search and Depth first search, problem characteristics, product system characteristics, issues in the design of search programs. Heuristic Search Technologies : Introduction to heuristic search, Generate and test, Hill Climbing, Best First search, A*, Problem reduction, AO*, constraint satisfaction and Means-ends-Analysis techniques	13
2	**Section II** Knowledge Representation : Information and Knowledge, Knowledge Acquisition and Manipulation, Issues in knowledge representation, Knowledge Representation Methods - Propositional Logic and First Order Predicate Logic, Resolution Principle, Horn's Clauses, Features of Language PROLOG, Semantic networks, Partitioned Semantic Nets, Frames, Scripts and Conceptual Dependencies.	13
3	**Section III**	14

	Expert Systems : Introduction, examples, characteristics Architecture, people involved and their role in building an expert systems, case studies of expert systems, MYCIN and DENDRAL; features of knowledge acquisition systems : MOLE and SALT. Natural Language understanding and Processing : Introduction, Complexity of the problem, Chompsky hierarchy of grammars, Techniques for Syntactic processing, Semantic Analysis, Discourse and pragmatic processing Introduction to Perception and Action., Introduction to Parallel and distributed AI. Introduction to Neural Networks, Fuzzy Logic and Genetic Algorithms and their applications	
4	*Outcome of the subject* *After the completion of the subject the student will be able to understand the basics of designing intelligent agents and to make them solve general purpose problems, represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences*	
	Total	40

11. Suggested Books:

SI. No.	Name of Books / Authors	Year of Publication
1.	Rich Elaine and Knight Kevin Shiva Shankar B Nair: Artificial Intelligence, Third Edition, Tata-McGraw Hill	
2	Rajasekharan, S. and Vijayalakshmi Pai, G. A. : Neural Networks, Fuzzy Logic and Genetic Algorithms, Prentice Hall of India.	
3	Russel & Norvig : Artificial Intelligence, Pearson.	
4	Patterson : Artificial Intelligence and Expert Systems, Pearson Education	
5	Jones, M. Tin : Artificial Intelligence Application Programming, Wiley India Pvt. Ltd.	
6	Tani Moto : Elements of Artificial Intelligence using Common LISP, Computer Science Press	

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1. Subject Code**:**   **MCA3505**   Course Title: **Major Project Ph 1**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | - | - | **Practical** | 0 | 4 |

4. Relative Weight**:**   **CWA** ☐   **LWA** ☐   **MTE** ☐   **ETE** ☐   **EPE** ☐

5. Credits**:** | **0** | **2** | 6. Semester | 5 |

13. Pre-requisite: _____

14. Subject Area: _____

15. Objective
10. Details of the Course:

SI. No.	Contents	Contact Hours
1	This Phase of the project is basically to study an existing manual system about the requirement gathering, finding out the feasibility and to finally come up with a blueprint about how to proceed with the implementation part A spiral bind report must be submitted for the same	40
2	*Outcome of the subject* *After the successful completion of this phase student will be able to analyze the existing system. What are the requirements of the user, what should be the inputs and how to produce the output*	
	Total	40

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Course Title: **Software Lab -IX(Dat Structure)**

1. Subject Code**:**   **MCA3506**

2. Contact Hours: **L: -**   **T: -**   **P: 4**

3. Examination Duration (Hrs.):   **Theory** | 0 | 0 | **Practical** | 0 | 3 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 2 | 6. Semester | 5 |

12. Pre-requisite: _____

13. Subject Area: _____

14. Objective: The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	A menu driven program for all the operations of data structure for Array A menu driven program for all the operations of data structure for Stack using Array A menu driven program for all the operations of data structure for Queue using Array A menu driven program for all the operations of data structure for Linked List A menu driven program for all the operations of data structure for Stack using Linked List A menu driven program for all the operations of data structure for Queue using Linked List A menu driven program for all the Searching operations for Array A menu driven program for all the Sorting operations for Array	40
2	*Outcome of the subject* *After the completion of the course the student will be able to understand the need and implementation of various data structures. Also he/she will be able to relate them to the real world.*	
3.	**Total**	40

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Course Title: **Software Lab
(Advance DBMS)**

1. Subject Code**:**   **MCA3507**

2. Contact Hours: **L: -**   **T: -**   **P:**   **4**

3. Examination Duration (Hrs.):   **Theory** | 0 | 0 | **Practical** | 0 | 3 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 2 | 6. Semester | 5 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: At the end of the course students should be able to learn about the Web-DBMS integration technology and XML for Internet database applications, familiarize with the data-warehousing and data-mining techniques and other advanced topics.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	Study on DBMS and RDBMS. Study on OODBMS and ORDBMS. Exercise on DDL, DML and DCL commands. Exercise on installation Oracle. Exercise on creation of database in oracle. Exercise on creation, modification of user in oracle. Exercise on Grant privileges to user. Exercise on Revoke privileges from user. Study on client-server databases. Study on PL/SQL and its Architecture WAP to print n numbers using for loop in PL?SQL Exercise on triggers and its types. Exercise on creation, modification triggers. Exercise on views. Exercise on creation, modification on views.	40

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2	***Outcome of the subject*** *Upon the completion of the subject, students will be able to understand the new developments in database technology, the impact of emerging database standards.*	
3.	**Total**	40

1. Subject Code**: MCA3504A**   Course Title: **Advance Java**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory**   **0** **3**   **Practical**   **0** **0**

4. Relative Weight**:**   **CWA**   **LWA**   **MTE**   **ETE**   **EPE**

5. Credits**:**   **0** **4.5**   6. Semester   5

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To create enterprise application development skills among students using Advanced Java.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Review of Java Basic Features, Applets, AWT Controls, Event Handling, Multithreading, I/O files. Swing: Features, components, swing vs AWT, swing containers, controls, using Dialogs, sliders, progress bars, tables, creating user interface using swing. Java Database Connectivity: Connectivity model, Java. SQL package, JDBC Exception classes, Database connectivity, Data manipulation and navigation, creating database applications.	13
2	**Section II** Java Servlets: Servelets vs CGI, Servlet life cycle, creating and running servlets. Networking: Networking basics, Client/server model, Java and the Net, TCP/IP client sockets, TCP/IP server sockets, Internet Address, URL, Data grams, creating networking applications.	13

3	**Section III** Java Beans: Component architecture, Components, Advantages of Beans, Bean Developer kit (BDK), JAR files. Java Server Pages: Introduction, JSP Architecture, JSP objects, developing Web Applications.	14
4	*Outcome of the subject*	

	After the successful completion of the course students can automate enterprises, provide client server solutions which can be stand alone or web based using Advanced Java	
5.	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Cornell, Gary and Horstmann Cay S.: Core Java, Vol I and Vol II, Sun Microsystems Press.	
2	Ivan Bayross: Web Enabled Commercial Application Development using Java 2.0, BPB.	
3	Schildt, Herbert: The Complete Reference Java 2, TMH.	
4	Keogh, James: J2EE: The Complete Reference.	

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1. Subject Code**:**   **MCA3504B**   Course Title: **.net using C#**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | **0** | **3** | **Practical** | **0** | **0** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **4.5** | 6. Semester | 5 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: In this course the students will be introduced about the development environment of windows application, interactions and handling of various events.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** Introduction To .NET Environment: The .NET strategy, the origins of the .NET technology, the .NET framework, the common language runtime, framework base classes, user and programs interface, visual studio .NET, .NET languages, benefits of the .NET approach. Introduction To C#: Introducing C#, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, difference between C++ and C#, difference between Java and C#.	10
2	**Section II** Object Oriented Aspects Of C#: Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions. I/O, Object Serialization And Remoting: System. I/O, Streams, Text Writer, Text Reader, Binary Writer, Binary Reader, Serialized Object Persistence and formatters, Remoting.	10

3	**Section III** Writing Windows Forms Applications And Deploying Windows Forms Applications: Writing Windows Forms Applications: Understanding Windows Forms, Working with Controls Dynamically in Code, Using Menus and MDI Forms, Using Inheritance in Windows Forms, Using Common Dialog Controls Deploying Windows Forms Applications: Deployment, Introduction, Understanding, Creating, Adding. Writing Asp .net Applications And Deploying ASP.NET Applications: Introduction to ASP.NET, Using Validation Controls, Managing State in ASP.NET Web Applications, Deploying ASP.NET Applications: Introduction, Creating, Project Deployment, Deploying ASP.NET Applications with Windows Installer.	10
4	**Section IV** Accessing Data With ADO .net: Looking Inside ADO.NET, Database, Using Objects, Using Data Adapters and Data sets, Using Binding to a Data Grid Control, Creating Applications.	10
5	*Outcome of the subject* *At the completion of this course, the student can design, create and populate Windows Forms and use user controls, menus in a Windows Forms application, generate code to form and control event procedures in a Windows Forms application, Create Multiple Document Interface (MDI) applications and Validate user input.*	
6	**Total**	40

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SECTION 6
Detailed Syllabus with Course Outcomes

SYLLABUS
SEMESTER-6

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Course Title: **Emerging Trends and Technologies**

1. Subject Code**:** **MCA3601**

2. Contact Hours: **L: 4** **T: 1** **P: -**

3. Examination Duration (Hrs.): **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:** **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | 0 | 4.5 | 6. Semester | 6 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To familiarize students with emerging technologies such as Cloud Computing, Mobile Computing and intelligent Agent Technologies.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** **Cloud Computing:** Introduction and use, Architecture, Service Models: infrastructures as a service, platform as a service, and software as a service; Cloud scenarios – Benefits: scalability, simplicity, vendors, security. Limitations – Sensitive information - Application development – Security concerns - privacy concern with a third party - security level of third party - security benefits Regularity issues: Government policies **Grid Computing:** Introduction and benefits, virtual organizations, grid Architecture and its relationship to other distributed technologies, grid application areas.	15

2	**Section II** **Mobile Computing :** Definition, Mobile computing architecture, Mobile Devices, Mobile System Networks: Cellular, WLAN, Ad hoc networks: Introduction to : GSM, CDMA, GPRS, EDGE; Introduction to Mobile Database; Mobile Applications ; Mobile Application Languages; features of Mobile Operating system: Palm OS, Symbian, Android.	15
3	**Section III** Intelligent Agent Technology: Introduction to agents, intelligent	10

	software systems, attributes, intelligent architectures, components of intelligent agent based distributed systems, agent communication protocols, Internet working applications of intelligent Agents.	
5	*Outcome of the subject* *Students will gain information about latest multimedia techniques, working to mobile computing and intelligent systems*	
6	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Rajkumar Buyya, James Broberg, Cloud Computing: Principles and Paradigms, Wiley Publications	
2	Raj Kamal, Mobile computing, Oxford Univerity	
4	Bannerjee, Rahul, 2003: Internetworking Technologies: An Engineering Perspective, PHI.	2003
5	Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, Edited by Gerhard Weiss, The MIT Press, LONDON	

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Course Title: **Advance Web Development**

1. Subject Code**:** **MCA3602**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   **-**

3. Examination Duration (Hrs.):   **Theory** | 0 | 3 | **Practical** | 0 | 0 |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | 0 | 4.5 | 6. Semester | 6 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To Understand the basics of computer programming languages using JavaScript, Apply JavaScript, XML and PHP effectively to create interactive and dynamic websites, Advanced use of ADO.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	**Section I** WWW concepts, Client/Server Computing, Web Servers and Clients, Web Browsers, A Systematic approach to Website creation, Client side and server side scripting, Creating interactive and dynamic web pages. **Java script:** Introduction, documents, forms, conditional and looping statements, functions, object, Form validation, Event and event handling; Browsers and the DOM, JQuery: Syntax, Selectors, Events and AJAX methods.	15
2	**Section II** **XML building blocks:** Elements, Attributes and Values, Document, comment, DTD building blocks, DTD types, XML Namespaces, XML schemes, Presenting XML with CSS and XSLT, XML-DOM, What is XHTML?	10

3	**Section III**	15

	PHP: Introduction, requirements, WAMP Server, PHP syntax, data type, variables, strings, operators, if-else, control structure, switch, array, function, file handling, form, sending email, file upload, session/state management, error and exception, PHP Database for dynamic Web pages.	
5	*Outcome of the subject* *After the successful completion of student will be able to make dynamic websites using the latest tools*	
6	**Total**	40

11. Suggested Books:

SI. No.	**Name of Books / Authors**	**Year of Publication**
1.	Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX blackbook, Wiley.	
2.	Web Enabled Commercial Application Development Using HTML, ,JavaScript, DHTML and PHP by Ivan Bayross BPB Publication	
3	James Lee, Brent Ware , "Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP" AddisonWesley, Pearson 2009	2009

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Course Title: **Practical – XI
(Advance Web
Development)**

1. Subject Code**:**   **MCA3603**

2. Contact Hours: **L: -   T: -   P: 4**

3. Examination Duration (Hrs.):   **Theory** | **0** | **0** | **Practical** | **0** | **3** |

4. Relative Weight**:**   **CWA** | | **LWA** | | **MTE** | | **ETE** | | **EPE** | |

5. Credits**:** | **0** | **2** | 6. Semester | **6** |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To Understand the basics of computer programming languages using JavaScript, read and write XML code, Apply JavaScript, PHP effectively to create interactive and dynamic websites.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	This laboratory course will mainly comprise of exercises on all the concepts covered in MCA3602. Practical file must be maintained accordingly	40
2	*Outcome of the subject* *After the successful completion of student will be able to make dynamic websites using the latest tools*	
3.	**Total**	40

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1. Subject Code**:**   **MCA3604**   Course Title: **Project Phase II**

2. Contact Hours: **L: -**   **T: -**   **P:**   **4**

3. Examination Duration (Hrs.):   **Theory** | 0 | 0 | **Practical** | 0 | 3 |

4. Relative Weight**:**   **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | 0 | 2 | 6. Semester | 6 |

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To encourage the student to develop working model by using front end and backend as per his/ her convenience.

10. Details of the Course:

SI. No.	Contents	Contact Hours
1	This phase will continue from the previous semester work in Project phase 1 now named as Project phase 2 where student have to develop working model of the study done in phase 1. Student will choose front end and backend as per his/ her convenience. A hard bind report must be submitted for the same	40
2	*Outcome of the subject* *After the successful completion of student will be able to make software projects.*	
3.	**Total**	40

1. Subject Code**:**   **MCA3605**   Course Title: **Industrial Training**

2. Contact Hours: **L: 4**   **T: 1**   **P:**   -

3. Examination Duration (Hrs.):   **Theory** | - | - | **Practical** | 0 | 4 |

4. Relative Weight**:**   **CWA** [ ] **LWA** [ ] **MTE** [ ] **ETE** [ ] **EPE** [ ]

5. Credits**:** | **0** | **2** | 6. Semester [6]

7. Pre-requisite: _____

8. Subject Area: _____

9. Objective: To ensure that student will the proper use of various packages used for software development